ABSTRACT

Title of Thesis: INVESTIGATION OF MIDDLE TO LATE WOODLAND TRANSITIONAL POTTERY AT THREE SITES (40SQ115/40BS101, 40BS103, AND 40BS107) IN THE SEQUATCHIE VALLEY, TENNESSEE

Peter Alan Sittig, Master of Professional Studies, 2021

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This thesis investigates three technological attributes of prehistoric pottery production in the Sequatchie Valley of southeastern Tennessee at Sites 40SQ115/40BS101, 40BS103, and 40BS107 as a means to understand the sociopolitical influences on residential populations during the transitional Middle to Late Woodland period between 1400 – 1250 BP. An assemblage of 282 sherds were analyzed to assess the technofunctional aspects of pottery production based upon Steponaitis's 1982 model of ceramic vessel functions in the southeastern United States. This research uses limestone temper grain size, average temper density, and prevalence of exterior surface treatments to investigate the sociopolitical influences on residential populations. Through this research it appears that the production of utilitarian cooking vessels indicates a cohesion of interaction amongst localized networks across the Sequatchie Valley.

INVESTIGATION OF MIDDLE TO LATE WOODLAND TRANSITIONAL POTTERY AT THREE SITES (40SQ115/40BS101, 40BS103, AND 40BS107) IN THE SEQUATCHIE VALLEY, TENNESSEE

by

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Chapter 1: Introduction

This thesis investigates the transitional period from the Middle Woodland to Late Woodland in the Sequatchie Valley of southeastern Tennessee by using ceramics from three sites (40SQ115/40BS101, 40BS103, and 40BS107) (Figure 1 and Figure 2). Ceramic vessel attributes from the archaeological assemblage of the three sites are used to determine if the transitional period between the Middle Woodland and Late Woodland contain evidence for regional technofunctional trends in the production of ceramic vessels. The specific attributes that are analyzed include the sizes of limestone temper grains, the density of limestone tempering, and the prevalence and variety of exterior surface treatments. Analysis of Steponaitis's 1982 model for Woodland period pottery in the Southeast is used as a basis for the investigation of possible technofunctional trends in the Sequatchie Valley region. This model investigates how the physical properties of ceramic materials affect the suitability of ceramics used for various functions.

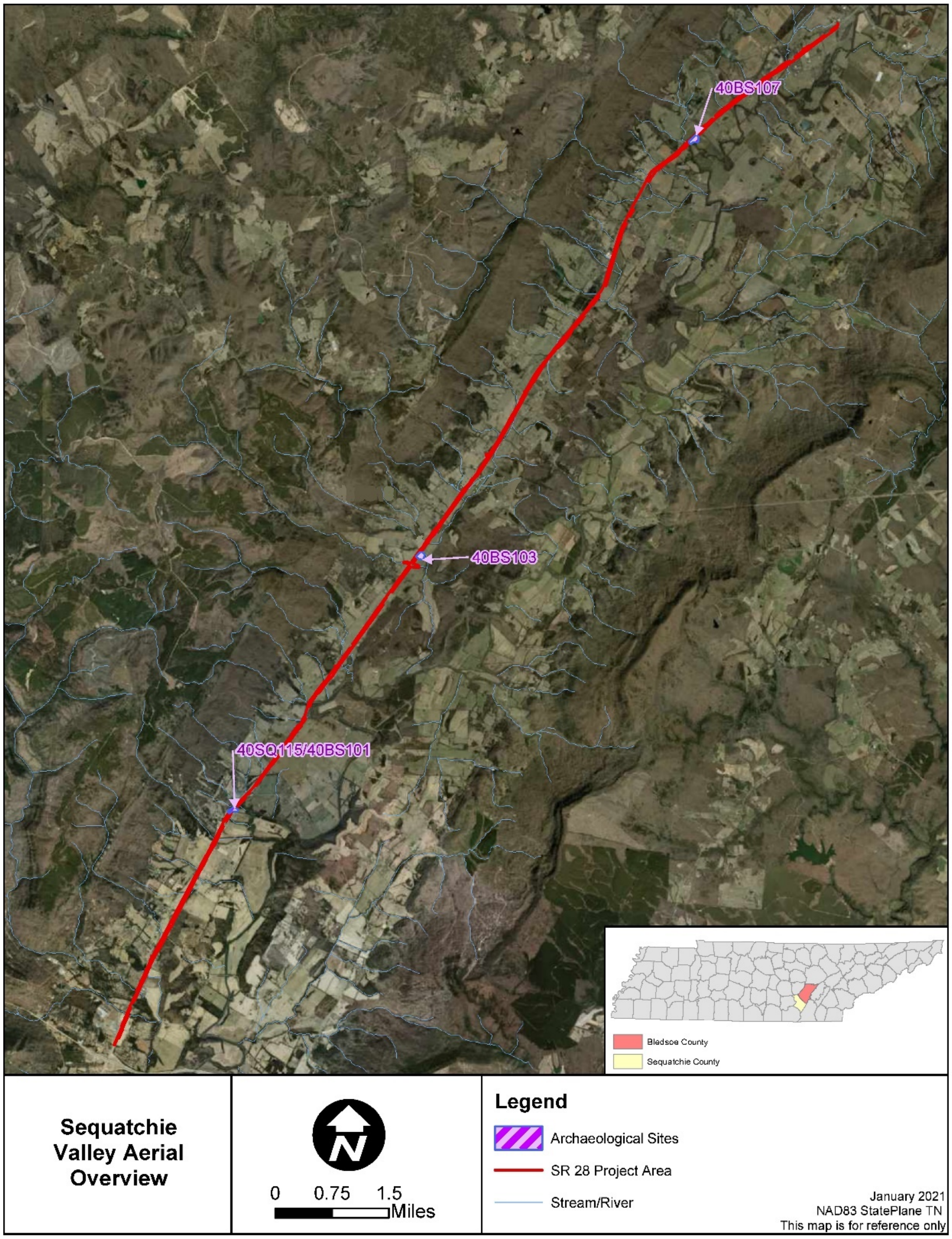

Figure 1. Aerial Overview of Archaeological Sites Studied in the Sequatchie Valley, Tennessee (image used with permission from AECOM).

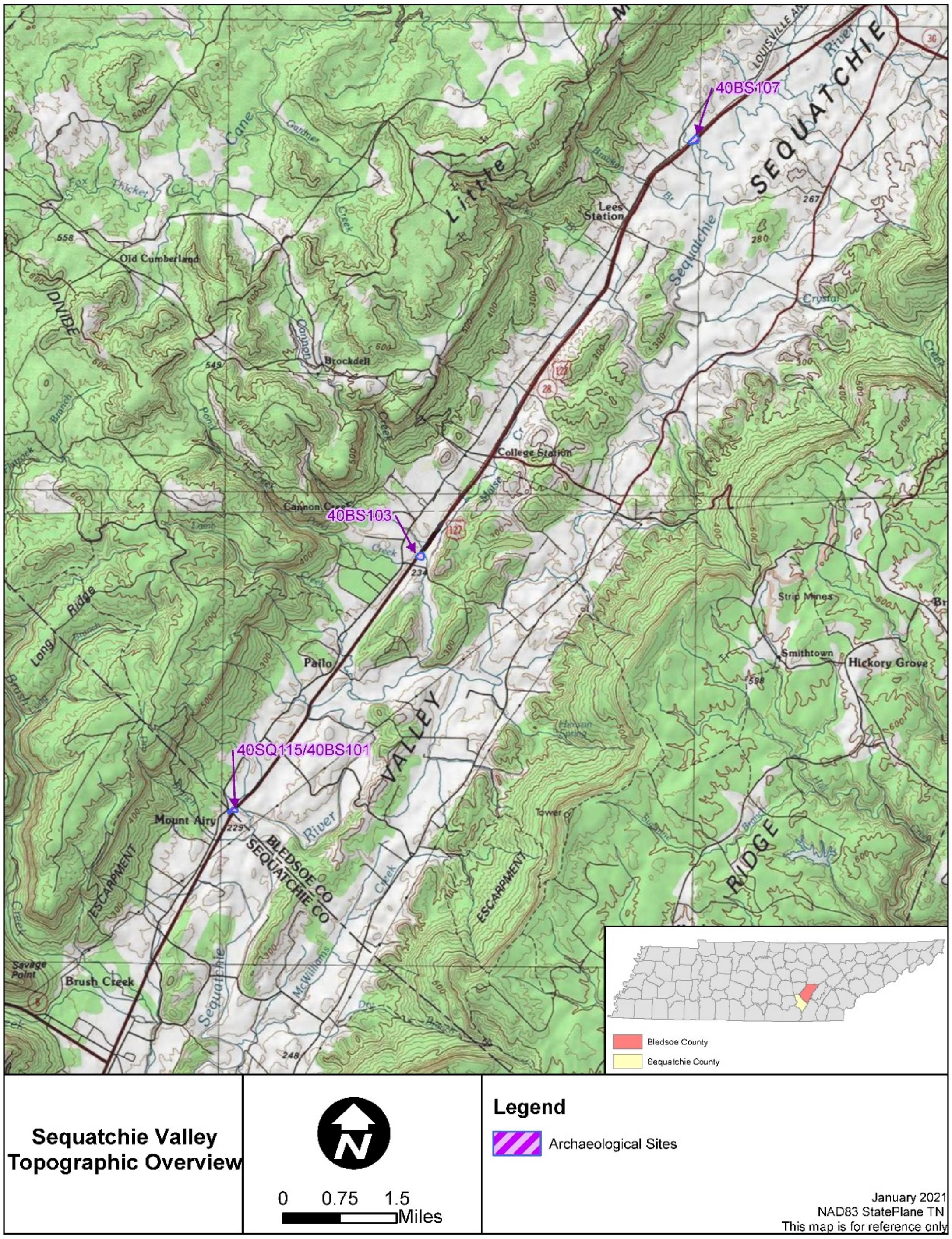

Figure 2. Topographic Overview of Archaeological Sites Studied in the Sequatchie Valley, Tennessee (image used with permission from AECOM).

A number of questions surrounding the production of ceramic vessels during the Middle to Late Woodland transitional period can be asked regarding physical properties of ceramics and what that tells us about the influences present in the Sequatchie Valley. Do we see differences in the size of limestone temper grains chosen during the production process? Do we see differences in the average density of temper present in the pottery sherds? What exterior surface treatments are used in the production process of pottery from these three sites? Does variability in the production process indicate different functions of pottery vessels? Are there trends of the production process that occur across all three sites, and therefore, the Sequatchie Valley region in general?

Answering the above questions will provide an analysis of the transitional Middle to Late Woodland period in the under-studied Sequatchie Valley region of southeastern Tennessee. Additionally, this research provides representation to the prehistoric populations which resided outside of the large ceremonial centers. Furthermore, my research acts as an additional data source on macroscopic ceramic vessel analysis for future research endeavors to consult.

This research has been organized to provide clarity and context as follows. Chapter 2 provides a theoretical framework for which to understand the pottery production process of Sequatchie Valley residents. Investigations concerning the degree to which there was a Hopewellian influence along with regional political structures during the Middle and Late Woodland are discussed along with *chaine operatoire* and Marxist ideas on modes of production. Additionally, a discussion of middle range theory is explored in conjunction with a complex network strategy that ties interregional interactions into the lives of those occupying the Sequatchie Valley during this time.

Chapter 3 provides a historical background of the transitional period of the Middle and Late Woodland to place the Sequatchie Valley sites studied here into a broader context of time and space. A regional analysis of the surrounding physiographic regions surrounding the Sequatchie Valley provides clarity with regards to how groups were interacting within an interregional context. Additionally, a discussion of prior archaeological endeavors which have taken place within the Sequatchie Valley provides further context to the types of sites and information gleaned from previous archaeological investigations that have been conducted in the valley.

Chapter 4 presents the methodological basis for how this research was completed. Laboratory procedures surrounding the measuring of limestone temper grain sizes are explained. In addition, I present a discussion of how the average limestone temper density was calculated. Next, I analyze the prevalence of exterior surface treatments on the three pottery assemblages. Finally, a discussion of the limitations of this research are explored to assist with the assumptions and scope of this work.

Chapter 5 is comprised of the results of my research surrounding the specific attributes of the pottery sherds that were analyzed. First, I provide an explanation of the data sets from each of the three Sequatchie Valley sites and the attributes which were analyzed. This discussion details the results of temper grain size, density, and surface treatments for each site's assemblage. Next, the resulting data is presented by individual site through a presentation of histograms to draw conclusions of Sequatchie Valley pottery from the three sites. Finally, I provide an inter-site perspective which presents the data sets holistically to provide a wider perspective of the Sequatchie Valley during the transitional Middle to Late Woodland.

Chapter 6 provides an analytical perspective to interpret the results of my research to provide context and significance to the pottery assemblages. I combine the results of the three individual sites to develop interpretations for the Sequatchie Valley region as a whole and analyze them through the individual attributes described above. The limestone temper grain sizes all appear as either coarse or very coarse. I suggest this is a result of technofunctional choices made by women pottery producers for increased resistance to thermal shock during the cooking process. This trend appears across all three sites as evidence of cohesion through marriage and regional ritual networks. The majority of average temper density results appear as medium or low density with only a small amount categorized as high density. I suggest these results are indicative of larger trends in the Woodland period where temper density decreases with time and is also evidence for the cohesion of regional pottery production techniques. Finally, exterior surface treatments are analyzed through the lens of technofunctional choice as well. Research results indicate an overwhelming majority of pottery from these three sites is categorized as Mulberry Creek Plain and bears no evidence for exterior surface treatment, except for a small collection from Site 40SQ115/40BS101. This small collection is evidence for an overall trend of regional pottery production techniques which deviates due to geographic position closer to larger regional networks where greater diversity in pottery production techniques exist.

Chapter 7 acts as a summation of the ideas presented and the interpreted results. Overall, this research suggests technofunctional choices were made to produce a vast majority of utilitarian cooking vessels based on the cohesion of interregional production techniques. The significance of this research provides new insight into the residential sites outside of large ceremonial mound centers. The sociopolitical influences of the Hopewell appears to have dwindled during this transitional period where interregional networks proliferated the production of largely utilitarian cooking vessels. Finally, suggestions for additional research are explored to expand upon the ideas laid out in this thesis. Comparisons of other physiographic regional data to the Sequatchie Valley is possible, along with the analysis of other tempers and surface treatments through the use of other analytical techniques, to provide a greater spatial and temporal analysis of southeastern Tennessee.

Chapter 2: Theoretical Framework

My research attempts to investigate the prehistoric interactions and political influence of outside groups through the analysis of pottery assemblages from the Sequatchie Valley during the transitional period from the Middle to Late Woodland period. I propose that the level of influence and interregional interactions can be evidenced through the production of ceramic vessels. I further propose that Sequatchie Valley residents used technological aspects of temper grain size and density, along with exterior stylistic choices, to reflect the influences in place at this time. Through an investigation and discussion of middle range societies and the *chaine operatoire* of technical production choices tied to the wider regional network strategies of these groups, I aim to provide insight into the lifeways of Sequatchie Valley residents. This provides additional insight into Middle and Late Woodland groups that lived away from mortuary mounds and ceremonial centers which have long been the focus of prior research endeavors in the Tennessee Valley during this time period.

Socio-Political Changes

Understanding the complexities of human interactions and the influences of outside entities on individuals and groups living on the prehistoric landscape of southeastern Tennessee can provide the context necessary to adequately frame the regional interactions within and outside of the Sequatchie Valley during this transitional period. The southeastern United States was fundamentally defined by its contemporaneity with the Hopewell florescence of the Ohio Valley (Griffin 1952).

Taken a step further, broad ideas on the Hopewellian sphere of influence related to mortuary and ceremonial practices has long been considered an indicator of the overall influence on daily life practices.

In reality, though, the vast majority of southeastern sites dating to this period do not yield evidence of intense involvement with Hopewell ceremonialism or exchange (Wright 2016:38). Modern ideas surrounding the non-mortuary aspects of Hopewell influence in the southeast presents a cohesion of non-local knowledge and ritual practice mixed with local ritualistic practices which would have strengthened the bonds of technical choices related to ceramic production. This shift of political influence is evidenced through the modes of ceramic production, described below.

Modes of Production

Karl Marx's (1973 [1857]) "modes of production" are analogous to the various layers of a peeled onion which reveal successive layers of an overarching system. These layers are comprised of different modes of production or classes which contribute to transform nature. Modes of production are essentially the bare-bones skeletons fleshed out by Marx's analyses of historical process (Patterson 2003:13). Marx and Engels (1976:32-33) laid out the foundations of a uniquely humanistic "creative intelligence" which was to be used productively, through labor. Their ideas stated that because of this innate intelligence, humans could not truly live a life without maintaining ties to one another through the various modes of production. Relationships between culture and labor were to be expressed through objectification and mediation (Patterson 2003:20; D'Amico 1981:13). Thus, the objects which tie together the relationships of people in the Sequatchie Valley for my research includes the ceramic vessel fragments in addition to the individual elements of temper and design which were used to produce the vessels.

Incorporating Marxist social thought through an archaeological perspective can be attributed to Vere Gordon Childe who aimed to integrate society, culture, and modes of production as interconnected parts of a social totality (Patterson 2003:44). Similar to later post-processual minded archaeologists, Childe would give attention to the cognitive aspects of human behavior. He concluded that "humans do not adapt to the world as it really is, but to the world as people imagine it to be" (Childe 1949:6-8; Trigger 2006). The shift from an era of food collecting to a succeeding era of food production was termed an "urban revolution" where the appearance of social stratification, the state, and densely populated settlements rose. In southeastern Tennessee during the Middle to Late Woodland transitional period, groups exist in a period somewhere between food collectors and food producers, explained as middle range societies.

Middle-Range Theory

Lewis Binford (1968/1972) first presents the proliferation of "middle-range societies" based upon cultural changes which were initiated in communities by external factors— such as alterations in the natural environment or relations with neighboring groups— that disturbed the existing adaptation.

Martin Gallivan (2003) suggests middle range society as an intermediate between the scale and complexity of mobile hunter-gatherer bands which dominated the last 10,000 years of human history versus state societies which permeate the modern world. These cultural transformations followed the adoption of food production where societies settled down, populations rose rapidly, and new technologies appeared. In many of these contexts, a reorganization of social relations accompanied these changes through which heterogeneity, inequality, and hierarchy eclipsed the structuring principles of kinship and of egalitarianism (Gallivan 2003:47). Transformative social relationships influenced by earlier traditions profoundly shape the historical development of middle range societies. A focus on the social dynamics and internal constraints of middle range societies confers upon humans a more active role in the social change. The choices made during the production of ceramic vessels on an individual and group scale informs the products through which middle range societies existed.

Chaine Operatoire

The social changes of the Sequatchie Valley can be understood further through technological choices of the procedures, skills, materials, and techniques used to produce pottery. *Chaine operatoire* establishes an explicit connection between ceramics and the techniques used to manufacture them. Further, this concept includes and organizes the active factors of materiality, activity, and knowledge involved in the process of creating artifacts (Santacreu 2014).

The social interactions and structures of the Sequatchie Valley during the Middle to Late Woodland transitional period are evidenced through the choices in pottery production. Specifically, the trends in temper size, density choice, and the surface treatments applied to the exterior of vessels represent societal decisions. The choices for technological and functional (technofunctional) style serve as an expression of the social and cultural identity of the region which promotes diversity and also regional cohesion of Sequatchie Valley residents (Tite, Kilikouglous, Vekinis 2001:317). The expressions of identity can be viewed from an individual perspective, but also as an expression of a group. A commonality of technological choices expressed in the production of pottery acts as a web through which to tie together groups. These common ties form networks.

Network Strategy

Network strategy can be explained through political actors of a society that operate on large spatial scales by manipulating distant social connections through the exchange of exotic goods or marriage partners. During the Middle Woodland, influences from groups such as the Hopewell were initially hypothesized to contain strong socio-political relationships which were tied to activities in the ritual and ceremonial sphere that emphasized integration within the community (Byers 2011). Recent research suggests that the Hopewellian sphere of influence was perhaps more limited in scope and strength when considering groups outside of major ceremonial centers, such as in the Sequatchie Valley.

Wright and Gokee (2019) propose a model which suggests that local connections to the larger Ohio Hopewell polity would have been evidenced in the artifact assemblages used for local ceremonial and ritual events. Non-mortuary ceremonial ceramic vessels which were originally thought to have been reserved for transport to the core of Hopewell influence in Ohio are seen to have been produced and used locally. The network strategy of groups in southeastern Tennessee and surrounding areas are viewed as more interregional in scale where material objects would have been used as a means of regional cohesiveness and less so as items of trade to be used by the Hopewell further afield. Southeastern groups may have strategically involved themselves with Hopewell interaction networks for social or religious purposes (Wright 2016).

Localized Influences

Theoretical ideas surrounding gender and marital relations provide context for the networks which exist at a smaller scale than even at the interregional level. Sassaman (2002) observes an erosion of unilineal systems of descent and unilocal postmarital resident patterns. Based upon evidence from Hudson (1976:388), Sassaman further states that inasmuch as pottery was a gender-specific (i.e. women's) technology, changes in descent and postmarital residence would have had potentially marked effects on regional distributions of pottery traits. Notably, changes toward more inclusive social systems, such as bilateral descent and bilocal residence, would have lifted barriers to the flow of people and technological choices in pottery production. The treatment of technofunctional data is used as information about technical choice and evidence of conscious expressions of cultural identity (Sassaman 2002).

Multiple communities of practice in which women are the primary producers of pottery is evidenced through generational and technological continuity in early pottery recovered in the Savannah River valley (Sassaman and Rudolphi 2001:408). Matrilocal residence patterns ensure geographical continuity where pottery design attributes were consistent. Additionally, marriages linked individuals to nonresidents who contributed to and influenced communities of practice. Essentially, the mobility of women through marriage invites multiple practices related to technology and surface treatments to be expressed in the production of pottery. Therefore, materials recovered as part of the archaeological record act as evidence of social relationships at the level of familial units.

These familial units can be viewed as a “means of reproduction” where the common goal is for successive generations to maintain production (Meillassoux 1972). Successive iterations not only concern the subsistence of a group but ensures the reproduction of the productive unit itself. The reproduction of the unit, both biologically and structurally, is assured through the control of women who represent the physiological agent of reproduction. Therefore, women in the context of the Sequatchie Valley, are the producers and keepers of knowledge surrounding the technofunctional aspects of pottery production. Women would have chosen the temper size, density, and surface treatments to produce technologically advantageous wares. This knowledge of technofunctional aspects of pottery production is then passed along through the interregional networks built from matrilineal ties.

Summary

Residential life outside of mortuary and ceremonial centers in the Sequatchie Valley during the transitional period from the Middle to Late Woodland can be evidenced through the means in which pottery was being produced. Regionalized socio-political cohesion and sharing of rituals and associated material culture, such as pottery, is now believed to have been the predominant force of influence during this time period. As middle range societies settled into the Sequatchie Valley, the regional networks strengthened through interregional marriages which disseminated knowledge of technofunctional choices through women to define the *chaine operatoire* of pottery production.

Chapter 3: Cultural Background

The Woodland Period is a culturally significant period in the American Southeast which spans between 3200 – 1000 BP and is divided further into the Early (3200 – 2200 BP), Middle (2200 – 1400 BP), and Late (1400 – 1000 BP) time periods (Anderson and Mainfort 2002). The Woodland is a period of expansion evidenced through the emergence of horticulture, pottery, and significant increases in population (Chapman and Shea 1981; McMahan 1983). Much of the Woodland period can be characterized by fairly small communities with unranked lineages and clans (Anderson and Mainfort 2002:6). Later, complex social structures and panregional interactions between populations occur.

This research is focused on the transitional period between the latter part of the Middle Woodland and the early portion of the Late Woodland based on radiocarbon dates taken from contexts associated with the pottery at the excavated sites in the Sequatchie Valley (Table 1). These dates range from approximately 1400 – 1250 BP. Below I provide a synthesis of these time periods, followed by a regional analysis of the physiographic regions surrounding the Sequatchie Valley, and then I include a summation of prior archaeological endeavors from the Sequatchie Valley itself.

Table 1. Detailed Radiocarbon Results.

							RCYBP	
Site	**Sample #**	**δ13C,‰**	**14C age (years BP)**	**±**	**pMC**	**±**	**1-sigma**	**2-sigma**
40SQ115/40BS101	1	-17.53	1410	20	83.92	0.22	1430-1390	1450-1370
40SQ115/40BS101	2	-24.90	1370	20	84.30	0.21	1390-1350	1410-1330
40BS103	1	-24.33	1260	20	85.49	0.23	1280-1240	1300-1220
40BS107	1	-25.09	1280	20	85.32	0.21	1300-1260	1320-1240
40BS107	2	-25.74	1250	20	85.58	0.22	1270-1230	1290-1210
40BS107	3	-24.94	1300	20	85.05	0.21	1320-1280	1340-1260

Middle Woodland (2200 – 1400 BP)

The Middle Woodland was a period in which communities formed widening interaction networks with one another for exchange and religious activity. The most elaborate expression of Middle Woodland ceremonialism is referred to as Hopewell, defined by Caldwell and Hall (1964). The Hopewellian interaction sphere spread materials and ideas across a flourishing landscape from the Great Lakes to the greater Eastern Woodlands from 1600 – 1100 BP (Wright 2014). The Hopewell appears to have involved three related spheres of ceremonial practice which includes the construction of massive earthen monuments, the prescribed burial of the dead within these monuments, and the accumulation of sacred objects with diverse motifs and iconography. Traditionally the Hopewellian sphere has been studied from a "top down" approach, where this sphere of influence is understood as Ohio Hopewell people stimulating ceremonialism in other regions.

In reality, more than 30 years of research in the American Southeast has produced evidence for dynamic inter-regional interaction spheres during the Middle Woodland period. In fact, there was probably a great deal of variation in social structure of this period throughout the Eastern Woodlands (Yerka et al. 2016). Separate spheres of ceremonial practice were likely contemporaneously focused on social integration, intensification, and renewal. Wright and Gokee (2019) state that monumental and mortuary assemblages would have been different than those which took place in the course of everyday life. Local ritual materials and practices in non-mortuary settings were largely a local tradition that had little to do with Hopewell.

Therefore, outside of mortuary ceremonial centers, the Middle Woodland would have been a period of increasing localized tradition based on interregional communication.

Late Woodland (1400 – 1000 BP)

The transition to the Late Woodland period has traditionally been described as a period of decline and simplification. In fact, this is a period of dispersal of the Hopewellian influence and the collapse of the earlier interregional systems that should be viewed as a time of appreciable cultural change (Yerka et al. 2016). The transition of power dynamics is evidenced through the emergence of large formal civic-ceremonial complexes that were continuously occupied and organized by hereditary elites. This transition of power was also viewed geographically as the centers of influence moved from the Hopewellian Midwest to the American Bottom and along the Gulf Coast.

On a localized scale, households and small communities began to spread with appreciable population growth. Technological innovations like the bow and arrow proliferate the availability of resources to fuel the growth and size of local groups. Hereditary status between lineages are witness to the beginnings of a dramatic shift in agricultural practices with the intensive cultivation of maize. In fact, research in some areas has shifted the classification of the Late Woodland to a period better described as the Emergent Mississippian. This shift is based upon the importance of maize agriculture and the appearance of large, permanently occupied communities as evidenced in the archaeological record (Anderson and Mainfort 2002:18).

Based on excavations at the three sites in the Sequatchie Valley, there is a general lack of evidence for a shift from the Middle to Late Woodland. It appears as though life in the Sequatchie Valley from approximately 1400 – 1250 BP was likely more attuned to a continuation of the Middle Woodland period where localized traditions continued away from the large ceremonial centers in other areas of the Southeast at this time.

Regional Analysis

While much has been studied from surrounding areas which have provided regional variety and context within given temporal units, the Sequatchie Valley is lacking in substantive work with little analysis having been performed on Middle Woodland sites. The Ridge and Valley physiographic region lies immediately east of the Sequatchie Valley, while the Cumberland Plateau lies west and north of the region, and the Middle Tennessee River Valley lies to its south into northeastern Alabama. These phases have largely been defined by previous archaeological investigations along the Tennessee River and its tributaries (Southeast Tennessee), the upper Duck and Elk Rivers (Cumberland Plateau) and the Guntersville basin (northeastern Alabama) (Table 2). Discussions of the various phases within each region will be presented below.

Table 2. Regional Woodland Phases.

<table>
<tr><th>Years BP</th><th>Woodland Period</th><th>Ridge & Valley Region</th><th>Guntersville Basin Region</th><th>Cumberland Plateau Region</th><th>14C Dates</th></tr>
<tr><td>1000</td><td rowspan="5">Late Woodland</td><td></td><td rowspan="2">Flint River</td><td rowspan="4">Mason</td><td></td></tr>
<tr><td>1100</td><td rowspan="3">Hamilton</td><td></td></tr>
<tr><td>1200</td><td>Flint River/Bell Hill</td><td>1280, 1260, 1250</td></tr>
<tr><td>1300</td><td rowspan="3">Bell Hill</td><td>1370, 1300</td></tr>
<tr><td>1400</td><td rowspan="2">Icehouse Bottom</td><td rowspan="4">Owl Hollow</td><td>1410</td></tr>
<tr><td>1500</td><td rowspan="8">Middle Woodland</td><td></td></tr>
<tr><td>1600</td><td rowspan="7">Patrick</td><td rowspan="4">Walling</td><td></td></tr>
<tr><td>1700</td><td></td></tr>
<tr><td>1800</td><td rowspan="5">Long Branch/McFarland/Neel</td><td></td></tr>
<tr><td>1900</td><td></td></tr>
<tr><td>2000</td><td rowspan="2">Green Mountain</td><td></td></tr>
<tr><td>2100</td><td></td></tr>
<tr><td>2200</td><td></td><td></td></tr>
</table>

Little Tennessee River Valley and the Ridge and Valley Region

Regional variants are observed in the Little Tennessee River Valley during this time largely based upon differences in ceramic surface treatments. Settlement patterning during this time period begins with the Patrick Phase (2200 – 1650 BP) where an intensification of localized residential activities is displayed (Davis 1990). The Patrick phase is characterized by limestone tempering with fabric marked surface treatments. Other Patrick phase components have included a more varied ceramic assemblage still dominated by limestone tempered fabric marked, but also included check stamped and plain sherds. Lithic assemblages are relatively consistent and include large triangular projectile points, blanks, preforms, ground-stone celts, and gorgets. It should be noted that Early Patrick phase components have been previously assigned to the preceding Long Branch phase of the Early-to-Middle Woodland (Davis 1990:59).

The latter half of the Middle Woodland in the Little Tennessee River Valley is defined as the Icehouse Bottom phase (1650 – 1400 BP) with a ceramic assemblage based on the recovery of limestone tempering with plain, simple stamped, brushed and cordmarked surface treatments, classified as Candy Creek series pottery (Davis 1990:59). Additionally, sand tempered plain, simple stamped, and brushed ceramics were also recovered, which are classified as the Connestee series which is more prevalent further east in the Appalachian Summit region. Hopewellian lithic artifacts recovered from the Icehouse Bottom site included small prismatic blades.

The early portion of the Late Woodland begins the Hamilton phase (1400 – 1100 BP) in the Ridge and Valley region. This phase is characterized by the limestone tempered ceramics, small triangular Hamilton projectile points, shell middens, and burial mounds (Wetmore 2002:267-268). Comparisons of various mortuary patterns at mound sites indicate egalitarian societies that relied heavily on shellfish with year-round site occupation surmised.

Middle Tennessee River Valley and the Guntersville Basin

The Middle Tennessee River valley region during the Middle Woodland period is marked by the Green Mountain phase (2100 – 1900 BP) where Mulberry Creek Plain pottery becomes the majority type and Wright Check Stamped is the most common decorated variety. Other carved paddle-stamped limestone tempered ceramics include the Bluff Creek Simple Stamped, Pickwick Complicated Stamped, and Flint River Cord marked varieties (Knight 1990). These varieties persist into the succeeding phases as well. Projectile points consist of the Greenville Cluster which include Camp Creek, Greenville, and Nolichucky types as well as Benjamin, Candy Creek, Copena, and Copena points.

Later in the Middle Woodland the Walling phase (1900 – 1650 BP) is similarly dominated by Mulberry Creek Plain, Flint River Cord Marked, Bluff Creek Simple Stamped, and other paddle stamped limestone tempered wares (Hoksbergen 2017:46, DeJarnette 1952:277). Another limestone tempered Harris Rocker Stamped minority type suggests influence from the Ohio River Valley where rocker stamping is common amongst similar Hopewellian assemblages (Knight 1990). Later in the Middle Woodland, the Bell Hill phase (1650 – 1250 BP) persists as a nearly identical representation of the Owl Hollow phase of central Tennessee with a dominance of plain limestone tempered pottery and spike cluster points.

The Late Woodland in the Guntersville Basin region is marked by a continuum of limestone tempered ceramics defined as the Flint River phase (and culture) (1500 – 1000 BP) with paddle stamped, plain, and brushed surface treatments such as Flint River Brushed, Cord Marked, and Incised varieties (Walthall 1980). The Flint River phase appears to have been related to the Hamilton phase in the upper Tennessee River valley where limestone tempered ceramics are dominate. Additionally, the utilization of the bow and arrow proliferates during this time as evidenced by small, thin Hamilton Incurvate projectile points (Hoksbergen 2017:57).

Upper Duck and Elk Rivers and the Eastern Cumberland Plateau

Significant changes in the artifact inventory of Middle Woodland groups in this region indicate a replacement of quartz-tempered Watts Bar ceramics with limestone tempered fabric-marked ceramics, in addition to a new tradition of stemless triangular projectile points (Faulkner 2002:189). While the ceramic assemblages in the Upper and Middle Duck and Elk River are dominated mainly by Wright check stamped sherds (Yerka et al. 2016), other temporal phases have been defined for the region which differentiate in temper and decoration.

The Long Branch (2400 – 1500 BP), McFarland (220 – 1850 BP), and Neel phases (2450 – 1850 BP) are largely contemporaneous which occur across this region during the Middle Woodland. The Long Branch phase first appears in the latter part of the Early Woodland and persists well into the Middle Woodland marked by the appearance of limestone tempering with fabric impressed, cord marked, and plain surfaces (Kimball 1985). The McFarland phase is predominately comprised of limestone tempered pottery with fabric marked vessels early and check stamped vessels later in the phase. In addition, expanded stemmed projectile points are observed. The Neel phase has long been suggested as a cultural variant within the Long Branch and McFarland settlements, essentially defined as special mortuary camps (Faulkner 2002:190). Neel phase ceramics are limestone tempered with cord marked and plain surfaces with only minor occurrences of rocker stamped types.

The later Owl Hollow phase (1700 – 1350 BP) represents a period where villages appear more intensely occupied and organized than preceding phases. The Owl Hollow site contains evidence of dual structure patterns which are likely to coincide with winter and warm-season domestic structures (Faulkner 1977). Pottery manufacturing during this phase consists of limestone tempering with simple stamping surface treatments observed on earlier sites and plain surfaces on later components. Projectile points are shallow side notched or lanceolate spike forms.

Into the Late Woodland period, technological and social traditions change which define the Mason phase (1200 – 1000 BP). Ceramics from this phase appear tempered with crushed chert and have textured surfaces with cord marking and net impressions. Projectile points appear as small triangular types. Additionally, community patterns appear as small dispersed habitation sites (Faulkner 2002:199).

Archaeological History of the Sequatchie Valley

The vast majority of what is known about the archaeological history of excavations in the Sequatchie Valley comes from efforts surrounding cultural resource management projects beginning in the late-twentieth century to present. Here, I aim to summarize the efforts of other archaeological endeavors within the valley.

A survey by Victor Hood (1973) identified many of the first sites in the region to be officially recorded with the state of Tennessee. Hood's unpublished manuscript identified a total of 91 archaeological sites (Table 3). Of the 91 total sites, 51 are located within Tennessee while 39 are located in Alabama and one is located on the border of the two states. Of the 51 sites identified within Tennessee, 26 are shell midden sites, 17 are mound sites, five are partial or individual encampment sites, five are termed lithic scatter or lithic reduction sites, two are rock shelters, and one is defined as a house site. The time periods represented across these sites span from the Archaic, Woodland, Mississippian, and historic time periods. The remaining sites have not been placed within a specific temporal period due to a lack of knowledge and/or an absence of diagnostic artifacts.

The sites identified as part of the 1973 survey were primarily focused on the identification of large shell midden and burial mound sites in close proximity to the Tennessee River at the far southern end of the valley. The majority of these sites were inhabited during the Middle to Late Woodland period. Unfortunately, many of the sites that were recorded were previously identified by looters and were subjected to the fruits of their labors and curiosities. In yet other circumstances, some of the sites were subjected to other disturbances related to farming, intentional flattening, and use as fill for various construction projects. Therefore, while this survey provided a plethora of quantitative data within the region, the qualitative data is lacking when considering the information collected from each site.

An additional survey conducted between 1975 and 1976 for the Huber Field strip mine which spanned across Bledsoe, Sequatchie, and Van Buren Counties in Tennessee identified an additional 189 prehistoric sites within the Sequatchie Valley region (Pace and Kline 1976:1-2). Of the 189 identified sites, 15 were placed within the Middle Woodland period.

Examination of Middle Woodland site data within the Sequatchie Valley from the last 50 years has provided some insights into the archaeological context of the valley during this period. First, the collection of identified sites from the 1973 Hood survey was primarily focused on large prominent sites on the landscape at the southern end of the Sequatchie Valley and represent Middle to Late Woodland and Mississippian period sites primarily represented by shell middens and mound sites. The Huber Field strip mine survey in the 1970s recorded a number of additional Middle Woodland sites which were ultimately categorized as lithic scatters and rock shelters. Therefore, this research adds a unique perspective from three sites where intact and culturally rich strata are still present. A plethora of data can be gleaned from the presence of these rare sites which holds information surrounding the production of ceramics from a relatively understudied region of southeastern Tennessee.

Table 3. Sequatchie Valley Sites Identified by Hood ca. 1973.

Site #	State	Site Type	Occupation	Comments
40BS1	Tennessee	Mound	Multicomponent Archaic and Woodland	Destroyed mounds. Ca. Six-acre site.
40BS2	Tennessee	Encampment	Unknown	
40BS3	Tennessee	Mound	Unknown	20 yards west of Sequatchie River. No cultural remains.
40BS4	Tennessee	Lithic Scatter	Woodland	
40BS7	Tennessee	Rock Shelter	Late Woodland	
40BS8	Tennessee	Lithic Scatter	Unknown	
40BS9	Tennessee	Temporary Encampment	Unknown	
40BS10	Tennessee	Temporary Encampment	Unknown	
40BS11	Tennessee	Mound, Temporary Encampment	Unknown	Mound group. Destroyed by plowing.
40BS12	Tennessee	Mound, Lithic Reduction	Unknown	Two mounds destroyed for highway fill. Lithic Reduction site with thick deposition of lithic materials.
40BS13	Tennessee	Mound	Unknown	Destroyed by plowing. Pecked limestone slabs. Skeletal remains.
40MD52	Tennessee	Shell Midden	Unknown	Destroyed by a road
40MD53	Tennessee	Shell Midden	Multicomponent Woodland	Partially destroyed from dredging operations and looting
40MD54	Tennessee	Shell Midden	Late Woodland	Partially destroyed from dredging operations and looting
40MI2	Tennessee	Mound	Multicomponent Woodland and Mississippian	Extensive temple mound

40MI31	Tennessee	Shell Midden	Multicomponent Archaic and Woodland	
40MI32	Tennessee	Shell Midden	Multicomponent Woodland	
40MI33	Tennessee	Shell Midden	Middle to Late Woodland	
40MI34	Tennessee	Shell Midden	Middle to Late Woodland	Skeletal remains
40MI35	Tennessee	Shell Midden	Middle to Late Woodland	Burns Island Site.
40MI36	Tennessee	Shell Midden	Middle to Late Woodland	
40MI37	Tennessee	Shell Midden	Middle to Late Woodland	
40MI38	Tennessee	Shell Midden	Middle to Late Woodland	Burns Island Site.
40MI39	Tennessee	Shell Midden	Middle to Late Woodland	
40MI40	Tennessee	Shell Midden	Unknown	
40MI41	Tennessee	Shell Midden	Multicomponent Woodland	
40MI43	Tennessee	Shell Midden	Unknown	Burns Island Site.
40MI44	Tennessee	Shell Midden	Woodland	
40MI45	Tennessee	Shell Midden	Early to Middle Woodland	Burns Island Site. Near two other shell concentrations
40MI46	Tennessee	Shell Midden	Multicomponent Woodland and Mississippian	Skeletal remains
40MI47	Tennessee	Shell Midden	Middle to Late Woodland	Burns Island Site.
40MI48	Tennessee	Shell Midden	Woodland	Burns Island Site.
40MI49	Tennessee	Shell Midden	Middle to Late Woodland	Burns Island Site.
40MI50	Tennessee	Shell Midden	Unknown	Destroyed from building construction
40MI51	Tennessee	Shell Midden	Late Woodland	TVA road runs through the center of the site.
40MI60	Tennessee	Mound	Unknown	
40MI61	Tennessee	Mound	Woodland	200 yards north of the Little Sequatchie River. Associated with three other mounds located 200 yards east. Skeletal remains.
40MI62	Tennessee	Rock Shelter	Unknown	Same site # as mound?
40MI63	Tennessee	Mound	Middle to Late Woodland	Layne Mound (landowner name). 350 yards from

				Sequatchie River. Skeletal remains.
40MI64	Tennessee	Mound	Late Woodland	Limestone slabs pecked to uniform rectangular shape. Skeletal remains.
40MI65	Tennessee	Mound, Shell Midden, House Site	Late Mississippian (Dallas, Lamar), Historic	Burns Island Site. Nine acres. Skeletal remains. Extensive Site.
40MI66	Tennessee	Shell Midden	Middle to Late Woodland	Eroding into the river
40MI67	Tennessee	Shell Midden	Unknown Woodland	
40MI68	Tennessee	Mound	Middle to Late Woodland	Extensive mound site. Eroded.
40SQ4	Tennessee	Lithic Scatter	Unknown	Adjacent to Sequatchie River
40SQ5	Tennessee	Lithic Scatter, Encampment	Unknown	
40SQ6	Tennessee	Mound	Middle to Late Woodland	300 yards east of Sequatchie River. Another possible mound nearby.
40SQ7	Tennessee	Mound	Middle to Late Woodland	300 yards east of Sequatchie River. Another possible mound nearby.
40SQ8	Tennessee	Mound	Unknown	40 feet east of Sequatchie River. No cultural material (looted)
40SQ9	Tennessee	Mound	Middle to Late Woodland	400 yards east of Sequatchie River. Destroyed.
40SQ10	Tennessee	Mound	Late Woodland	500 yards east of Sequatchie River. Burial mound with skeletal remains.

Chapter 4: Methodology

The ceramic assemblages from the three Sequatchie Valley sites (40SQ115/40BS101, 40BS103, and 40BS107) were subjected to three analytical procedures focused on temper size, temper density, and surface treatment. I propose that the technofunctional choices of limestone temper size, temper density, and prevalence of exterior surface treatments are indicative of the choices ceramic producers made for the production of utilitarian cooking vessels. The effort put into the production and use of temper was measured by analysis of temper grain size and the frequency of the grains in a given space, defined as temper density. Additionally, ceramic sherds were categorized based on the prevalence of exterior surface treatments. The categories used to define the exterior surface treatments place the pottery into typologies which have been previously defined from adjacent regions and sites.

Laboratory Procedures and Sampling

Analysis of the ceramic assemblage of the three sites in the Sequatchie Valley was conducted by myself with assistance from other AECOM employees over the course of this research endeavor. Many more sherds were part of the assemblage than were used in this analysis. Therefore, the sherds which were subject to analysis needed to contain certain requirements. Ceramics larger than 0.5 inches (1.2 millimeters [mm]) were classified according to temper and surface treatments. Sherds smaller than 0.5 inches (1.2 mm) were counted, but not analyzed or included in this research. Additionally, only ceramics with limestone tempering from the Middle to

Late Transitional Woodland period were analyzed to further limit the overall number of analyzed sherds to a reasonable sample size. Therefore, a total of 282 ceramic sherds were subjected to analysis for the purposes of my research. The variables which were analyzed included Temper Size, Temper Density, and Exterior Surface Treatment, which will be described in detail below. All three of the variables chosen reflect human actions which are able to be culturally quantified. Furthermore, these attributes reflect active design considerations of the pottery producers (Stoltman 2015:16).

The methodology I based my analysis on is most closely related to the process of petrographic analysis, but ultimately my methods are also different in a number of ways. Petrographic analysis is traditionally used as a geological technique which provides reliable identification of minerals. Petrography has been used for pottery analysis as a means of collecting the mineral and rock fragment composition which is most compared to as an anthropomorphic sedimentary rock where individual components which make up the pottery sherd can be viewed. Because the process of petrography is destructive and requires mounting on slides to view under a microscope, I opted for a minimally destructive means for analysis which also did not require a high-powered microscope considering that with a 10x powered hand lens I was able to view and conduct analysis on the limestone tempered grains from my samples.

Analysis of individual ceramic sherds involved an initial determination of the amount of temper visible on the profile wall of the sherd. The samples for this research solely consisted of limestone tempered vessels. One of the unique factors involved with limestone tempered vessels is the natural leaching of limestone over time. Therefore, in many cases polygonal voids (i.e. leached limestone) were measured due to the absence of any existing limestone temper (Stoltman 2015:138).

If less than four individual temper grains were not visible, needle-nosed pliers were used to break the sherd into approximately two evenly sized pieces that were able to be mended to present a clean fresh break to gather adequate data points. The determination of four temper grains was determined as the minimum necessary to conduct the analysis without breakage necessary considering that four datapoints would be needed to determine an adequate range of temper size for each sherd.

Limestone temper size was measured using extant temper grains and voids of temper grains simultaneously. Upon the initial subset analysis of sherds it was determined that the amount of temper was split approximately in half between extant limestone temper grains and those which were leached away.

Limestone Temper Grain Size

Temper grain size is a key variable to understand the technofunctional choices of pottery production. The incorporation of larger temper grain size is indicative of utilitarian cooking vessels, while smaller temper grains would have been reserved for specialty vessels used in religious ceremony (Steponaitis 1982). This assumption is based upon research on repeated events of heating and cooling, defined as thermal shock. A fine tempered vessel would lose large proportions of strength if subjected to thermal shock, while coarsely tempered vessels would retain strength even after severe thermal shock. Additional research conducted by Hoard et al. (1995) suggests that coarse limestone tempering with larger grain sizes should perform better under repeated episodes of heating and cooling. Therefore, vessels with coarse tempering would have been advantageous for utilitarian cooking purposes where thermal shock would have been the norm. Vessels with fine tempering would not have been preferred for utilitarian purposes when subjected to thermal shock and cracking, and ultimately breakage of the vessel would occur.

Initially, the temper size was to be determined from a qualitative data perspective based on three categories defined on a range from Fine to Medium to Coarse. Analysis of a sub-sample which allowed for an initial understanding of the range of potential temper grain sizes within the assemblage was conducted. Based upon this assemblage compared to Heimlich's 1952 work on pottery assemblages in the Guntersville Basin of Alabama, I came to the conclusion that this assemblage would be more accurately categorized as Fine, Coarse, and Very Coarse. Heimlich states that the average temper size of Mulberry Creek Plain pottery types measure 1 mm with a range between those that are only detectible microscopically (<1 mm) to upwards of 2 mm. To place Heimlich's results into qualitative categories, temper grain sizes measuring less than 1 mm would be *Fine*, those measuring between 1 and 2 mm would be *Coarse*, and those 2 mm or greater would be categorized as *Very Coarse*. Interestingly, the artifact assemblage from the Sequatchie valley consists of an average temper size of 2 mm with a range from 1 mm to 9 mm.

Therefore, the qualitative data for this assemblage would be more accurately defined as ranging from Coarse to Very Coarse. Determining the qualitative categories is based upon definitions of the quantitative analysis. Coarse grain sizes are defined as ranging from 1 to 2 mm and Very Coarse grain sizes range from 2 mm and greater. This range was chosen based on the initial data indicating that grain sizes measure between 1 and 9 mm and comparing the results to prior analysis of the same Mulberry Creek Plain pottery types (Heimlich 1952:21).

In order to categorize grain size ranges into qualitative results each ceramic sherd was analyzed by measuring four individual grain sizes. It became apparent that four measurements from each sherd would allow for an adequate quantifiable amount of data for the general size of the sherds and the amount of temper present. In addition, time constrains for completing the analysis weighed in on this decision. With regards to individual measurement concerns, each measurement was taken from the widest visible portion of each grain. The four grains chosen for analysis would be a range from the most easily identifiable small grain, two mid-size grains, and the largest grain for a calculated average which was used to categorize into the above-mentioned categories.

Limestone Temper Density

In addition to the temper grain size acting as an agent for technofunctional choices in the ceramic production process, temper density assists in the process as well. Previous research conducted on shell tempering states that the distribution of tempering is bimodal, with most of the cooking vessels having relatively abundant temper, and most of the non-cooking vessels having relatively sparse temper (Steponaitis 1982:86). Therefore, a prevalence of higher temper density correlates with ceramic production reserved for ceramics used for utilitarian cooking functions. Conversely, lower density temper ceramics are then associated with vessels reserved as ceremonial serving vessels.

Initially, the temper density was to be determined qualitatively based on three categories ranging from *Low density* to *Medium density* to *High density*. Analysis of a sub-sample determined that this was an appropriate range to use. Therefore, I came to the conclusion that these three classifications would group temper density into representative classes appropriate to the assemblage used in this research. Each category will be described in detail below.

Determining the qualitative categories is based upon definitions of the quantitative analysis. The temper density was defined as the average number of pieces of temper (#) per area of the cross-section Fresh Break Surface (FBS) (Density = # / FBS). Other studies where temper densities have been analyzed involves the process of point counting where a superimposed rectangular grid is laid over a thin section to record minerals at each point of intersection of the grid (Stoltman 2015:12). This process was not able to be performed because of the lack of ability to overlay the superimposed grid, hence, the density formula to determine the average number of pieces of temper per area. I believe that the use of my formula achieved similarly meaningful results compared to using the point counting method.

The overall artifact assemblage from all three sites averaged 19 pieces of temper per area. Therefore, Low density temper is defined as an average density ≤15 grains of temper per area. Medium density temper is considered an average density ranging between 15 and 30 grains per area. High density temper is considered an average density ≥30 grains per area. This range was chosen based on the initial data indicating that the range of densities in the ceramic assemblage was between 3 and 50 grains per area.

Exterior Surface Treatment

The appearance of exterior surface treatments on ceramic vessels, in conjunction with the size of temper grain sizes and average temper density, is used in this research to explore the technofunctional aspects of the pottery production process. The appearance of various exterior surface treatments are not only beneficial as a temporally diagnostic trait, but also as an attribute of technofunctional decisions during the production process. Surface treatments are usually carried out at the end of the drying phase, once the pottery vessels reach the critical leather-hard stage when the paste is relatively dry and is consistent enough to undertake further actions but is still wet enough to be workable and sensitive to technical gestures made by potters (Santacreu 2014). Decorative treatments may have varied functions which serve both utilitarian and symbolic purposes. Certain types of decoration may modify the shape or surface to act as secondary form characteristics which may enhance the utility of the vessel (Rice 2015:154).

Research revolving around the functionality of vessels with surface treatments in both laboratory setting conditions (Schiffer et al. 1994) and comparing it to prehistoric artifact assemblages (Cogswell and O'Brien 1997) find that vessels with roughened surfaces have statistically lower incidence of spalling than those with smooth surfaces. The artifact assemblages studied from early Late Woodland and Mississippian periods contained either cordmarked or plain exterior surface treatments and contained either clay or grit tempering. The conclusions were that roughened exterior surface treatments reduce the incidence of spalling because it helps to permit steam to escape from the interior of a vessel's paste (Cogswell and

O'Brien 1997:171). Therefore, vessels with evidence of exterior surface treatments are more functionally advantageous as utilitarian cooking vessels than those with plain or no treatment.

For my research, surface treatment typology was determined based on a comparative analysis of sherds from this assemblage to those from surrounding sites in adjacent regions. A grand total of eight exterior surface treatments were identified in this research assemblage. Six pottery types were clearly identifiable in this assemblage and include Bluff Creek Simple Stamped, Longbranch Fabric Impressed, Mulberry Creek Plain, Mulberry Creek Scraped, Pickwick Complicated Curvilinear Stamped, and Pickwick Complicated Rectilinear Stamped. Each of the varieties are described below. Additionally, two unidentifiable types were observed which include Unidentified Stamped and Unidentified Scraped and Smoothed.

Bluff Creek Simple Stamped Variety

Bluff Creek Simple Stamped vessels are characterized by stamped impressions of a parallel lined paddle which occur from the lip to base on wide mouthed jars. The lines are stamped parallel with the lip or set obliquely. The vessels have a barely perceptible constriction at the neck and slight flare of the rim. The lip is characteristically flattened and occasionally bears oblique incisions or notching. An added rim strip which bears obliquely stamped parallel lines occurs occasionally. Sherds of this type are characteristically thin (Heimlich 1952:18).

Figure 3. Bluff Creek Simple Stamped Sherd from Site 40SQ115/40BS101 (image used with permission from AECOM).

Longbranch Fabric Impressed Variety

Longbranch Fabric Impressed vessels are characterized by the presence of plain plaited fabric and basketry impressions which occur on vessels similar in form to the plain limestone tempered ware. Characteristically, the fabric marked vessels appear to be smaller and thinner with rims more decidedly incurving or flaring, and with rounded bases. The lip is frequently flattened, with an irregular overhanging on the exterior. In some cases, vessels with thick loop handles and a number of lug handles have been identified (Heimlich 1952:17).

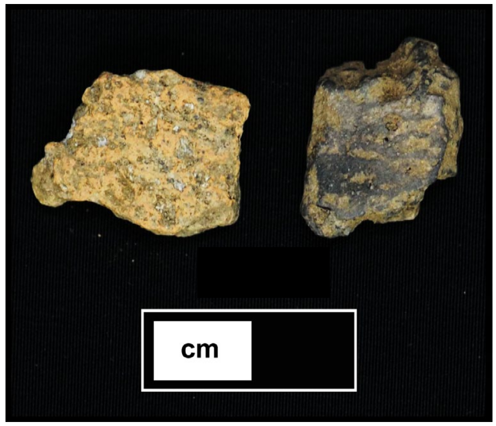

Figure 4. Longbranch Fabric Impressed Sherd from Site 40SQ115/40BS101 (image used with permission from AECOM).

Mulberry Creek Variety

Mulberry Creek vessels are characterized as sherds that contain 10 to 30 percent white and light gray angular limestone tempering which ranges in size from 2 mm in length to particles only detectable microscopically. The average size of limestone fragments is slightly under 1 mm. The temper generally is softened by decomposition. Vessels are well modeled and are relatively thin considering the size. The surface is well smoothed on the interior and exterior. The exterior occasionally shows tool markings (scraped), and frequently, burnishing. Forms are represented as wide mouthed, deep bowls and jars. The lips are rounded and are slightly thinner than the body wall with occasional flattening. Infrequently the lips are thickened or folded back. Common occurrences are flat bases with tetrapodal supports. Bases suggest small vessels of the wide mouthed jar variety. Smaller, globular jars with vertical to flaring rims, marked angles at the juncture of rim and shoulder, and round or flattened-round bases have been observed in addition to round bodied bowls with added rimstrips (Heimlich 1952:15-17).

Figure 5. Mulberry Creek Plain Sherds from Site 40SQ115/40BS101 (image used with permission from AECOM).

Pickwick Complicated Stamped

Pickwick Complicated Stamped vessels are characterized as a highly developed type represented by a specialized vessel form and a great variety of stamped designs. Surfaces of unstamped areas of vessels are exceptionally well smoothed and occasionally burnished. The vessels are well modelled. Both diamond shaped and curvilinear patterns are observed. Some diamond shaped patterns occur almost invariably on the neck and high rims of small globular jars with narrow folded back rim strips while the bodies are plain. The lips are flattened or rounded, and the rims are nearly vertical. Vessel walls are uniformly thin, ranging from 3 to 4 mm (Heimlich 1952:18).

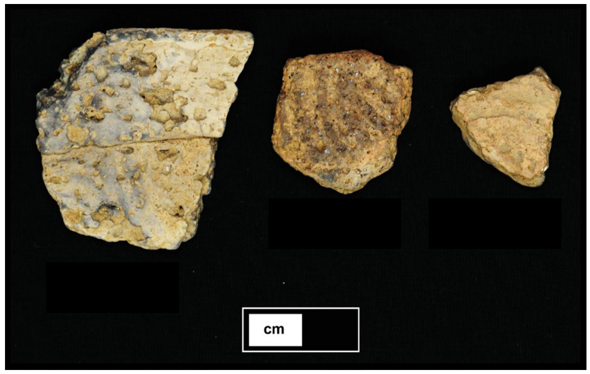

Figure 6. Pickwick Complicated Stamped Sherd from Site 40SQ115/40BS101 (image used with permission from AECOM).

Limitations in the Data Collection Process

While conducting the analysis I recognized certain limitations of this data collection process and associated interpretations. My methods of collecting temper grain size is likely to be only partially unbiased. During the production process of shaping, smoothing, and decorating a ceramic vessel the grains may be more likely to be arranged horizontally through the process of production which would present the smaller grain face when analyzing the cross-section. Therefore, my data may be skewed towards a collection of smaller grain sizes than may be present.

With regards to limitations in the data set when considering temper density, I recognize that only having analyzed the cross-section of the pottery sherd does not allow for a comprehensive view of density across the entire matrix of the sherd. Having analyzed only the cross-section does not consider the density of the temper within an entire sherd. The data set is therefore incomplete and an assumption of the density of the entire sherd must be assumed using my methodology.

Furthermore, a limitation in the data set when considering the analysis of surface treatments includes the possibility of erosional processes skewing the dataset towards higher instances of plainware varieties. Erosional processes may have affected sherds from different depositional contexts at higher rates than from other contexts. Therefore, the weathering process has the potential to have essentially erased the original surface treatment which would have been categorized as a plainware variety. This would skew the data toward more instances of plainware sherds than other decorated varieties.

The methodology and analysis techniques I chose to use were effective and useful in determining the uses of ceramic vessels on the Middle Woodland landscape at the three sites studied for this research. Meaningful and significant results are able to be gleaned through these techniques. Subsequent analysis of the data collection results provides clarity into the technofunctional choices for the production of vessels with various uses.

Chapter 5: Results

I propose that variability in the ceramic assemblage from the three sites in the Sequatchie Valley are indicative of technological choices for specific pottery functions that are evidenced across all three sites. Specifically, I anticipate differences in the limestone temper grain sizes which would indicate the production of ceramics with multiple functions. Similarly, I expect to see differences in the average density of temper present which would also indicate the production of vessels with different functions. Additionally, I presume a correlation between the appearance of exterior surface treatments and the temper patterns. Finally, I expect to see patterns which occur across all three of the sites considering all are largely contemporaneous in time and space, as sites that would have likely been occupied in the Sequatchie Valley during the Middle to Late Woodland transitional period. Therefore, at the end of this chapter I analyze the data from the sites together.

Explanation of Data Sets

To answer these research questions, my dataset consists of the ceramic assemblages from three sites (40SQ115/40BS101, 40BS103, and 40BS107) in the Sequatchie valley of southeastern Tennessee which contain transitional Middle to Late Woodland artifact assemblages consisting of limestone tempered ceramics. The dataset is comprised of artifacts excavated by AECOM during the summer of 2020 (Jorgenson et al. 2021).

AECOM excavated a total of five sites to satisfy contractual agreements with the Tennessee Department of Transportation funded through the Federal Highway

Administration. Three of these sites contained ceramic assemblages which contained temporally definitive dates from the transitional Middle to Late Woodland which consisted of an adequate ceramic assemblage with limestone tempering. Ultimately, a total of 282 ceramics were analyzed from sites 40SQ115/40BS101 (n=100), 40BS103 (n=82), and 40BS107 (n=100) in the Sequatchie valley.

Based upon the analytical methods described in the previous chapter, several results can be gleaned from the datasets related to temper size, temper density, and prevalence of exterior surface treatment. Each of the three analyzed attributes and their associated results are described below.

Temper Grain Size

The limestone temper grain sizes of ceramic sherds were measured to investigate the functions of ceramic vessels in the Sequatchie Valley. Previous research surrounding temper grain size related to the function of vessels suggests that smaller grain sizes correlate with vessels reserved for ceremonial functions, while larger grain size suggests vessels produced for utilitarian cooking functions (Steponaitis 1982; Hoard et al. 1995). With this assumption, results from my research are now discussed.

The limestone temper grain size ranges from 1 mm to 9 mm across all the sites. The overall average temper grain size from all three sites measures 2 mm. The histograms below (Figure 7, Figure 10, and Figure 12) related to temper grain size indicate the limits of each bar along the X-axis with a range of 5 mm. The Y-axis indicates the number of sherds analyzed. The top of each bar indicates the number of sherds which fit into each bar category.

Temper Density

The temper density of ceramic sherds was measured to assist in the determination of the range of uses for ceramic vessels in the Sequatchie Valley. Previous research on densities of shell tempering of vessels in Alabama suggest that utilitarian cooking vessels were produced with relatively abundant temper, while most of the non-cooking vessels had relatively sparse temper (Steponaitis 1982:86). As discussed in Chapter 4 above, limestone tempering densities are related to thermal shock of temperature related stress. With this assumption in mind, results from the analysis of the Sequatchie Valley sites are now discussed.

The limestone temper ranges from 3 to 53 pieces of temper across all the sites. The average temper density from all three sites measures 19 pieces. The histograms below (Figure 8, Figure 11, and Figure 13) related to temper density indicate the limits of each bar along the X-axis with a range of 3 pieces of temper. The Y-axis indicates the number of sherds analyzed. The top of each bar indicates the number of sherds which fit into each bar category.

Exterior Surface Treatment

Surface treatments applied to the exterior of vessels was observed and quantified to use as an additional attribute in the analysis of vessel functions in the Sequatchie Valley. Rice (2015) has previously stated that decorative treatments may serve both utilitarian and symbolic purposes and may also enhance the utility of a given vessel. Furthermore, previous research has provided insight that roughened surfaces reduce the incidence of spalling. Considering the assumption that the presence of exterior surface treatments can be advantageous to the utility of both utilitarian and symbolic vessels, I suggest that sherds with evidence of exterior surface treatment should correlate with large limestone temper grain sizes and high temper density which would have functioned as utilitarian cooking vessels. Conversely, pottery sherds with no evidence of surface treatment (plain) will correlate with smaller limestone temper grain sizes and lower temper densities which would have not functioned as well for cooking purposes.

Site 40SQ115/40BS101 Results

40SQ115/40BS101 Temper Grain Size Results

A range of grain sizes are presented in the histogram below (Figure 7). Despite the lack of obvious distributed clusters, the results are nevertheless significant. The most prevalent cluster of grain size measures between 1 and 2 mm, categorized as Coarse with the next most prevalent bar indicating grain sizes greater than 2 mm, categorized as Very Coarse. Of the 100 sherds analyzed at this site, 56% (n=56) are categorized as Coarse and 44% (n=44) are categorized as Very Coarse. No sherds were analyzed which contained temper grains less than 1mm (Fine).

Therefore, groups occupying Site 40SQ115/40BS101 sites were producing all vessels (100%) with Coarse or Very Coarse grain sizes interpreted as a functional choice for the production of utilitarian cooking vessels. The selection of larger grain sizes is associated with the production of cooking vessels which would have been more resistant to the thermal shock of repeated heating and cooling events associated with vessels in contact with a heating source. No data from this assemblage indicates Fine grain sizes were chosen during the ceramic production process. Therefore, the technofunctional choices surrounding the need for resistance to thermal shock appears to be a key factor.

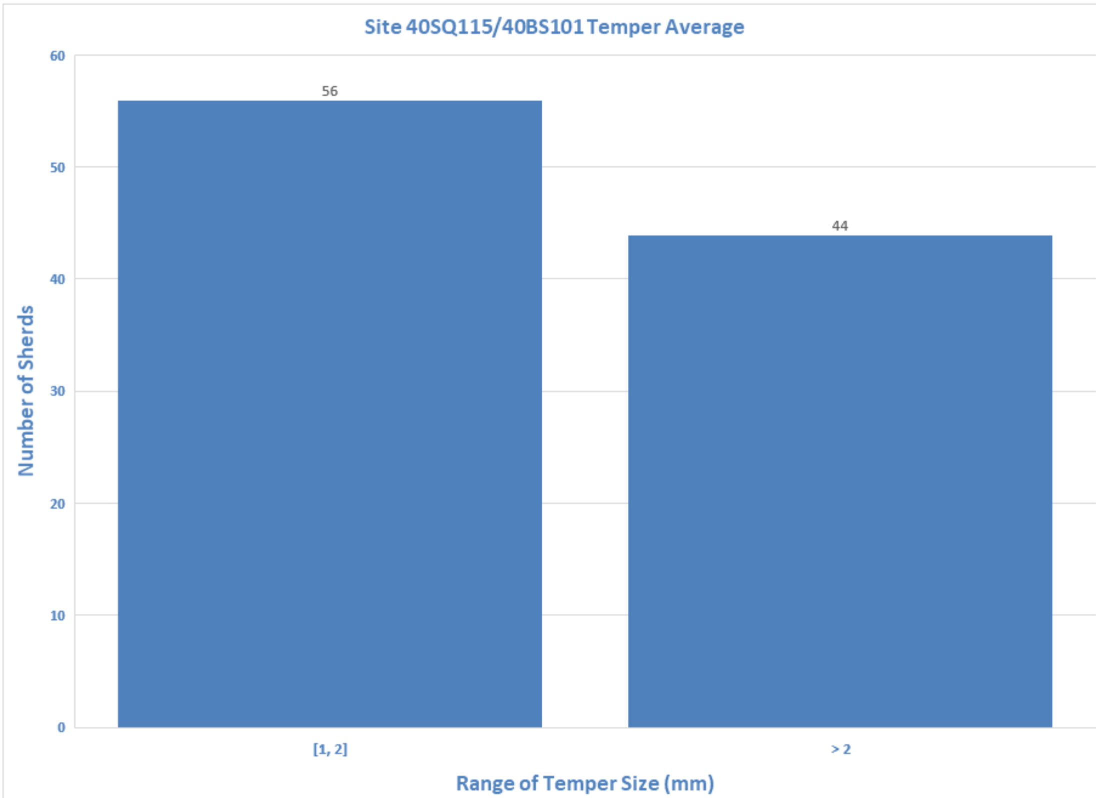

Figure 7. Temper Average at Site 40SQ115/40BS101.

40SQ115/40BS101 Temper Density Results

A range of temper densities at Site 40SQ115/40BS101 are present in the histogram below (Figure 8). The most prevalent cluster of temper density, categorized as low-density temper, measures ≤15 pieces of temper per area. A total of 48% (n=48) of sherds are low-density. The second most prevalent cluster where a total of 45% (n=45) of sherds, categorized as medium-density, measures between 15 and 30 pieces of temper per area. The smallest frequency of temper density consists of sherds with ≥30 pieces of temper per area, categorized as high-density represented by only

7% (n=7) of the sherds. Based on these clusters, the most prevalent density observed from this assemblage consists of low-and-medium-density temper.

Therefore, the results indicate a preference for low-and-medium-density tempering at Site 40SQ115/40BS101 represented by 93% (n=93) of the sherds. When considering the technofunctional implications during the production process, the results indicate that pottery was produced with lesser density than originally hypothesized. The implications of this lack of correlation are explored later in the analysis chapter.

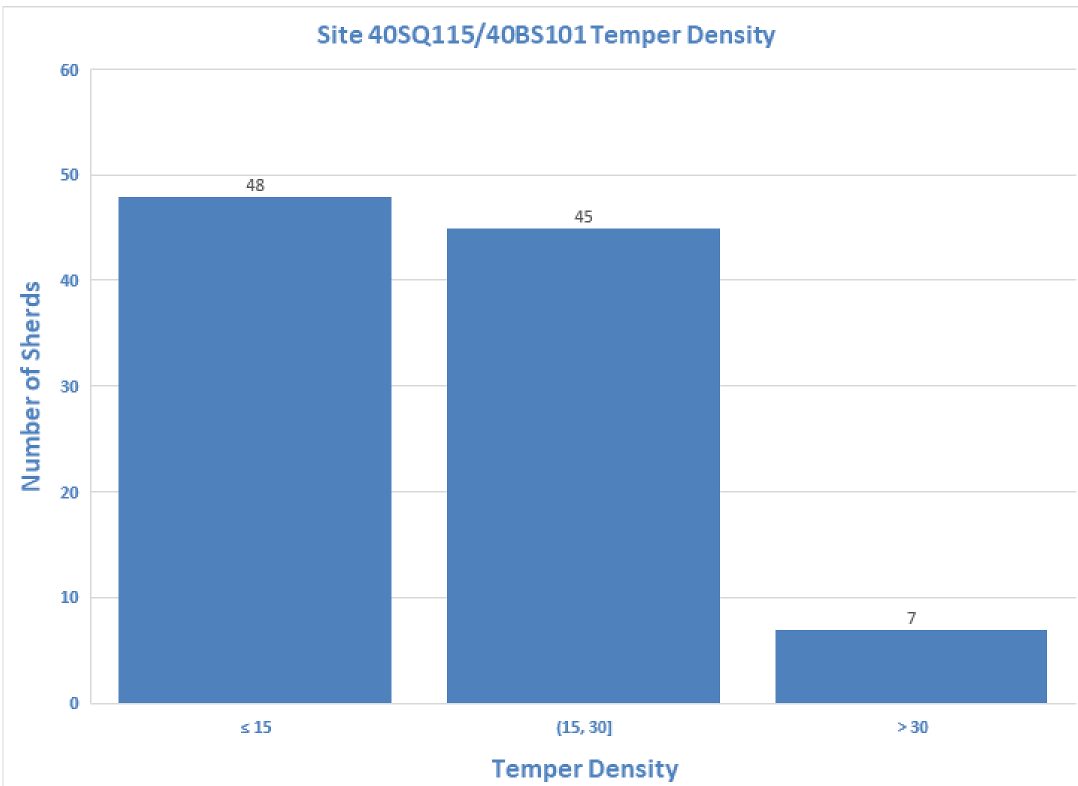

Figure 8. Temper Density of Site 40SQ115/40BS101.

40SQ115/40BS101 Exterior Surface Treatment Results

Exterior surface treatment data was analyzed for the pottery assemblage at Site 40SQ115/40BS101 due to the array of pottery types associated with this site. The histogram below indicates a range of exterior surface decorations which were used in conjunction with overall pottery types to identify the prevalence and significance of pottery associated with the Middle Woodland period at Site 40SQ115/40BS101 (Figure 9).

The data indicates there are six pottery types represented by eight exterior surface treatments. The six pottery types are Mulberry Creek, Pickwick, Long Branch, Bluff Creek, and two Unidentified types. Of the 90 sherds identified as Mulberry Creek, there are two varieties where exterior surface treatments are plain (n=88) or scraped (n=2). Of the four sherds that are typed as Pickwick, three are curvilinear complicated stamped and one is rectilinear complicated stamped. Sherds which are typed as Longbranch have exterior surface treatment which is fabric impressed (n=2). One sherd was identified as a Bluff Creek type which has exterior surface treatment that is simple stamped. Three sherds were unable to be adequately typed but contained exterior surface treatments which were indeterminate stamped (n=2) and scraped/smoothed (n=1).

To summarize, 88% (n=88) of Middle Woodland pottery from Site 40SQ115/40BS101 is comprised of Mulberry Creek plain, which represent a lack of exterior surface treatment. The 12% (n=12) of sherds with evidence of surface treatment are comprised of treatments which include: scraped and scraped/smoothed, curvilinear and rectilinear complicated stamped, simple stamped, indeterminate stamped, and fabric impressed. Based on these results, it appears the expected technofunctional advantage of producing vessels with exterior surface treatments to reduce spalling and thermal shock cracking during repeated heating and cooling episodes was not most often applied during the production process. In fact, the majority of vessels lacked evidence of exterior surface treatment all together. Explanations of these results are explored in detail in the analysis chapter.

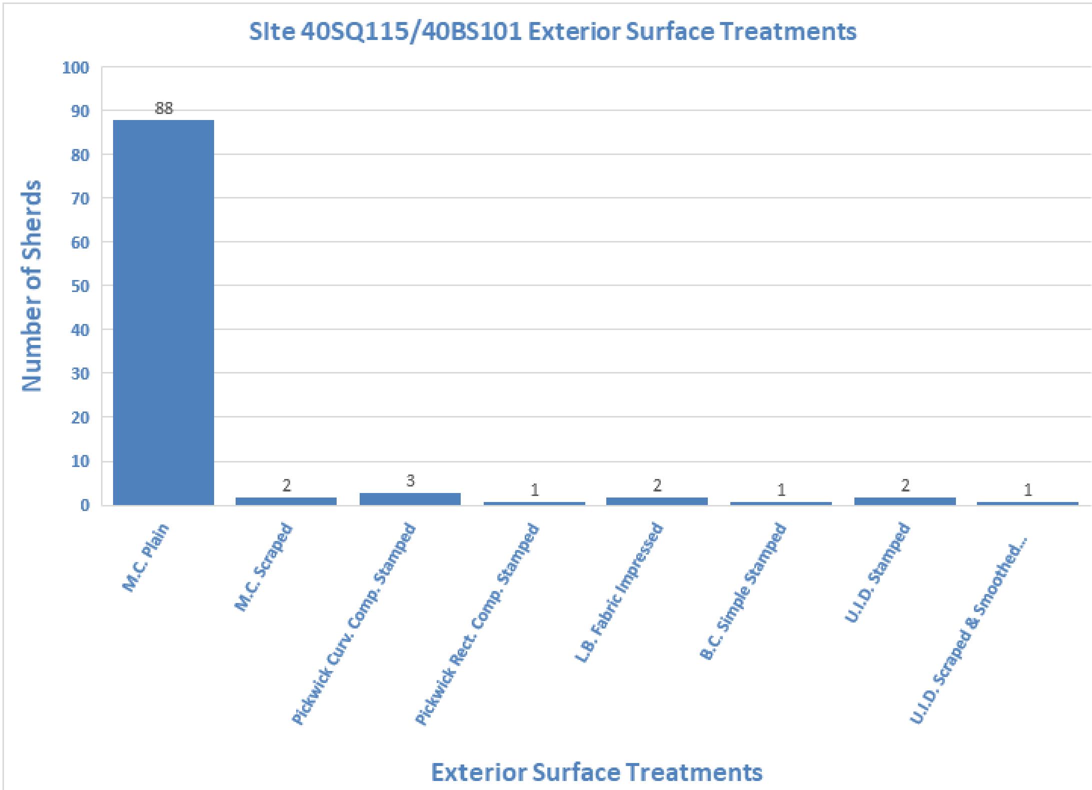

Figure 9. Site 40SQ115/40BS101 Exterior Surface Treatments.

Site 40BS103 Results

40BS103 Temper Grain Size Results

A range of grain sizes for the sherds from 40BS103 are presented in the histogram below (Figure 10). Despite the lack of obvious distributed clusters, the results are nevertheless significant. The most prevalent cluster of grain size measures between 1 and 2 mm, categorized as Coarse with the next most prevalent bar indicating grain sizes greater than 2 mm, categorized as Very Coarse. Of the 82 total sherds analyzed at this site, 59% (n=48) are categorized as Coarse and 41% (n=34) are categorized as Very Coarse. No sherds were analyzed which contained temper grains less than 1mm (Fine).

Therefore, groups occupying Site 4BS103 sites were producing the all vessels with Coarse or Very Coarse grain sizes. The selection of larger grain sizes correlate with the production of utilitarian cooking vessels which would have required an increased resistance to thermal shocks associated with repeated heating and cooling events. No data from this assemblage indicates Fine grain sizes were chosen during the ceramic production process. Technofunctional choices for resistance to thermal shock appears to be a significant factor in the production process.

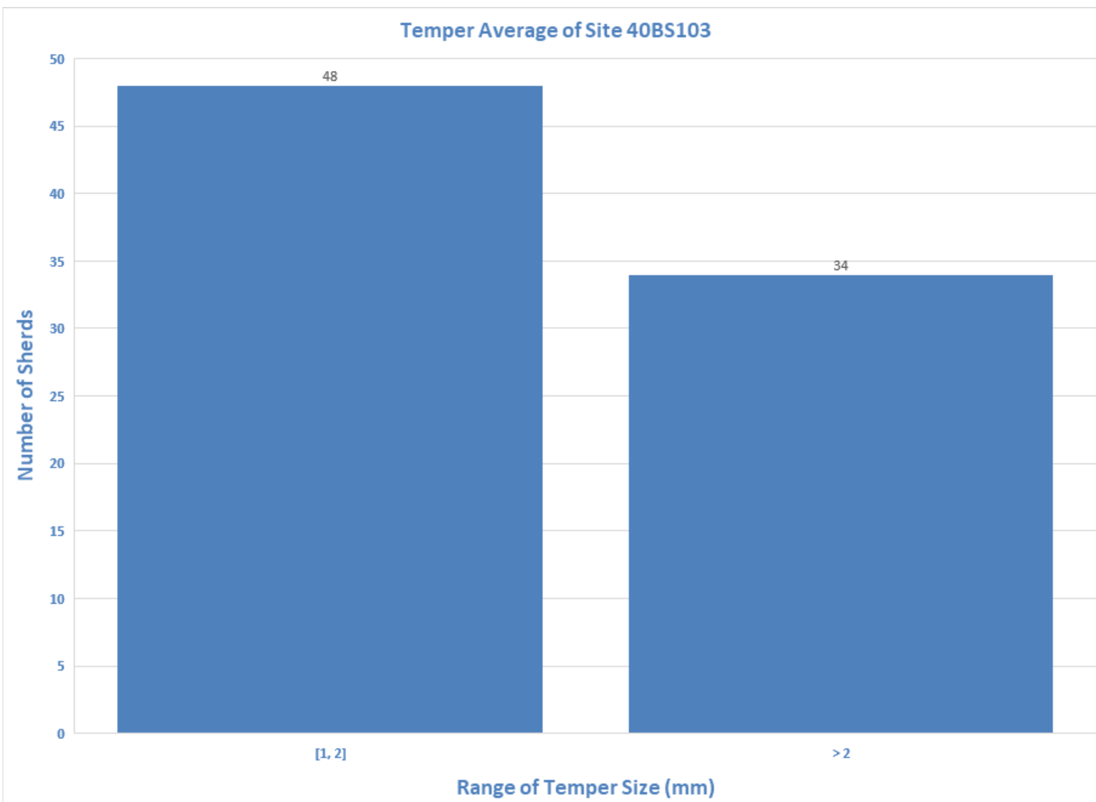

Figure 10. Average of Temper Grain Size for Site 40BS103.

40BS103 Temper Density Results

A range of temper densities at Site 40BS103 are presented in the histogram below (Figure 11). A total of 51% (n=42) categorized as medium-density temper, measures between 15 and 30 pieces of temper per area. A total of 38% (n=31) was categorized as low-density, measures ≤15 pieces of temper per area. The smallest frequency of temper density consists of 11% (n=9) of sherds with ≥30 pieces of temper per area, categorized as high-density. Based on these clusters, the most prevalent density observed from this assemblage consists of medium-density temper.

The results from the Site 40BS103 assemblage indicate a preference for the inclusion of a medium-density temper, followed by low-density. When considering the technofunctional implications during the production process, the results indicate that pottery was produced with lesser density than originally hypothesized. Detailed considerations and implications of the results are provided later in the analysis chapter.

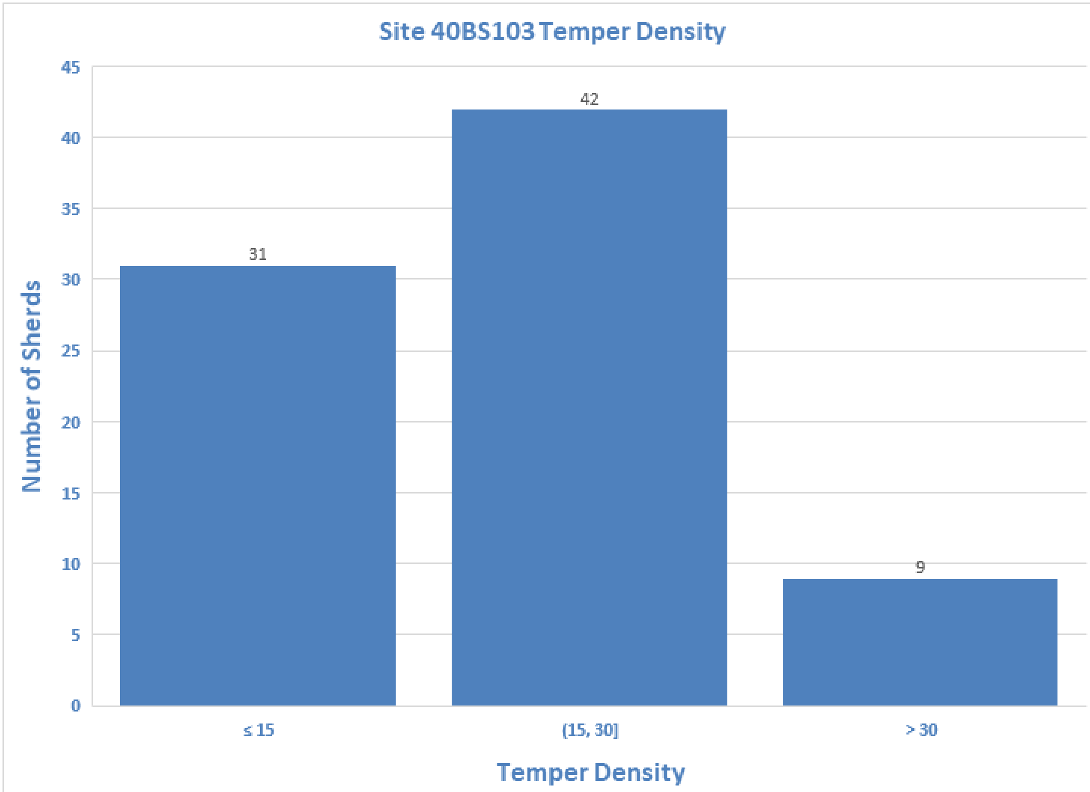

Figure 11. Temper Density of Site 40BS103.

40BS103 Exterior Surface Treatment Results

Results of the analysis on the prevalence of exterior surface treatments on sherds from Site 40BS103 are clear. A total of 100% (n=82) sherds analyzed are Mulberry Creek plain and contain no evidence of non-plain exterior surface treatments. Based on these results, the technofunctional advantage of applying an exterior surface treatment to reduce spalling and thermal shock cracking does not appear to have been chosen. The implications of this realization will be considered later in the analysis chapter.

Site 40BS107 Results

40BS107 Temper Grain Size Results

A range of grain sizes are presented in the histogram below (Figure 12). Despite the lack of obvious distributed clusters, the results are nevertheless significant. A total of 54% (n=54) of the data was categorized as Coarse with the remaining 46% (n=46) categorized as Very Coarse. No sherds were analyzed with contained temper grains less than 1mm (Fine).

Based upon these findings, those producing ceramics at Site 40BS107 were only choosing Coarse and Very Coarse temper grain size as the ideal technofunctional choice for the production of utilitarian vessels. The coarser grain sizes would have resisted the thermal shock more effectively during repeated heating and cooling events associated with cooking episodes. No data on fine grain sizes was apparent in this assemblage to indicate that a resistance to thermal shock was not a key technofunctional choice.

Figure 12. Average of Temper Grain Size for Site 40BS107.

40BS107 Temper Density Results

A range of temper densities at Site 40BS107 are present in the histogram below (Figure 13). A total of 69% (n=69) of the analyzed sherds were categorized as medium-density temper. The second most prevalent cluster, or 19% (n=19) of the data was categorized as low-density. The smallest frequency of temper density consists of only 12% (n=12) of sherds categorized as high-density. Based on these clusters, the most prevalent density observed from this assemblage consists of medium-density temper.

Therefore, groups occupying Site 40BS107 were producing the highest frequency of vessels with medium density. When considering the technofunctional implications during the production process, the results indicate that pottery was produced with lesser density than originally hypothesized. Further considerations on this apparent lack of correlation are explored later in the analysis chapter.

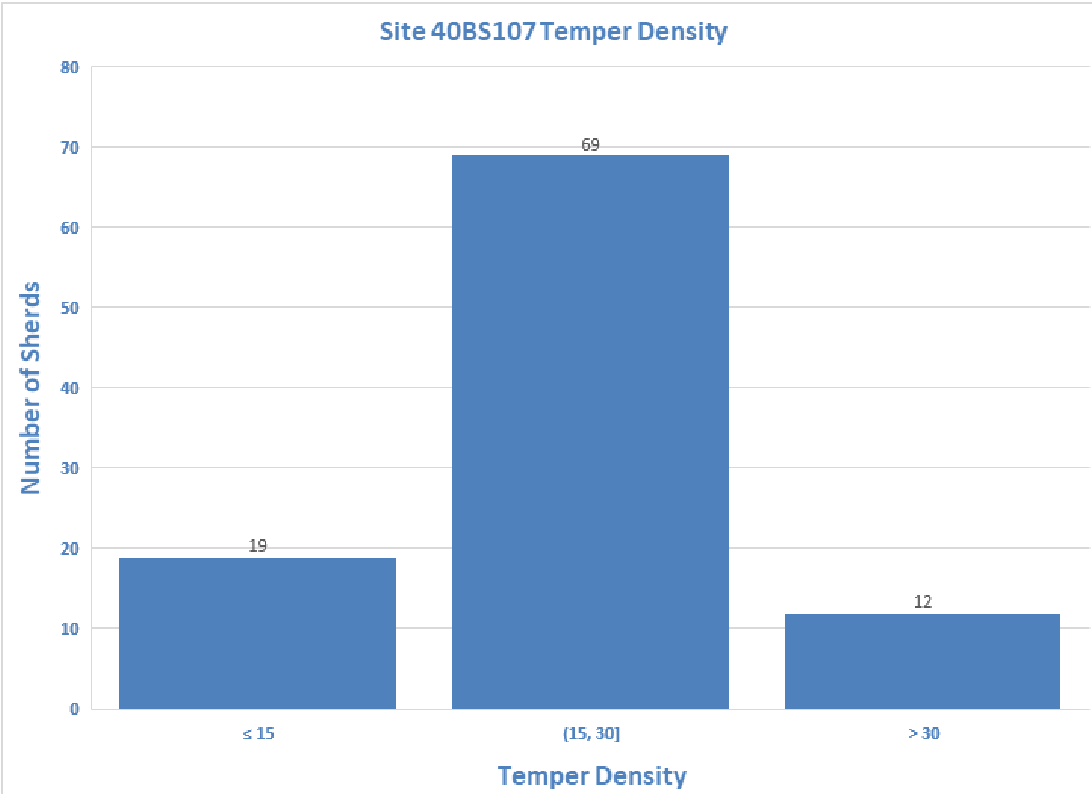

Figure 13. Temper Density of Site 40BS107.

40BS107 Exterior Surface Treatment Results

Results of the analysis on the prevalence of exterior surface treatments on sherds from Site 40BS107 are quite apparent. All (100% or n=100) sherds analyzed are categorized as Mulberry Creek plain and contain no evidence of other exterior surface treatments. Based on these results, the technofunctional advantage of applying an exterior surface treatment to reduce spalling and thermal shock cracking does not appear to have been chosen. Further considerations of these results follow in the analysis chapter.

Results from an Inter-Site Perspective

Sites Combined Temper Grain Size Results

The grain sizes from all three sites are combined and presented in the histogram below (Figure 14). The most prevalent grain size was categorized as Coarse with 56% (n=158), with the next most prevalent bar grain size categorized as Very Coarse with 44% (n=124) of the sherds. No sherds were analyzed which contained temper grains less than 1 mm (Fine).

The overall trends from the analysis of the three sites individually continue when considering them from an inter-site perspective. These three sites act as a summation of the Sequatchie Valley as a whole, considering their contemporaneous existence in time and space. Therefore, 100% (n=282) of the data suggests that residents of the Sequatchie Valley during this time period were choosing Coarse and Very Coarse limestone temper as a means to produce utilitarian vessels which would have withstood thermal shock associated with cooking. Essentially no data from the entirety of the sites studied in the Sequatchie Valley for this research suggest that Fine limestone temper grains were selected for in the production process. This suggests that the vast majority of vessels were produced for utilitarian purposes.

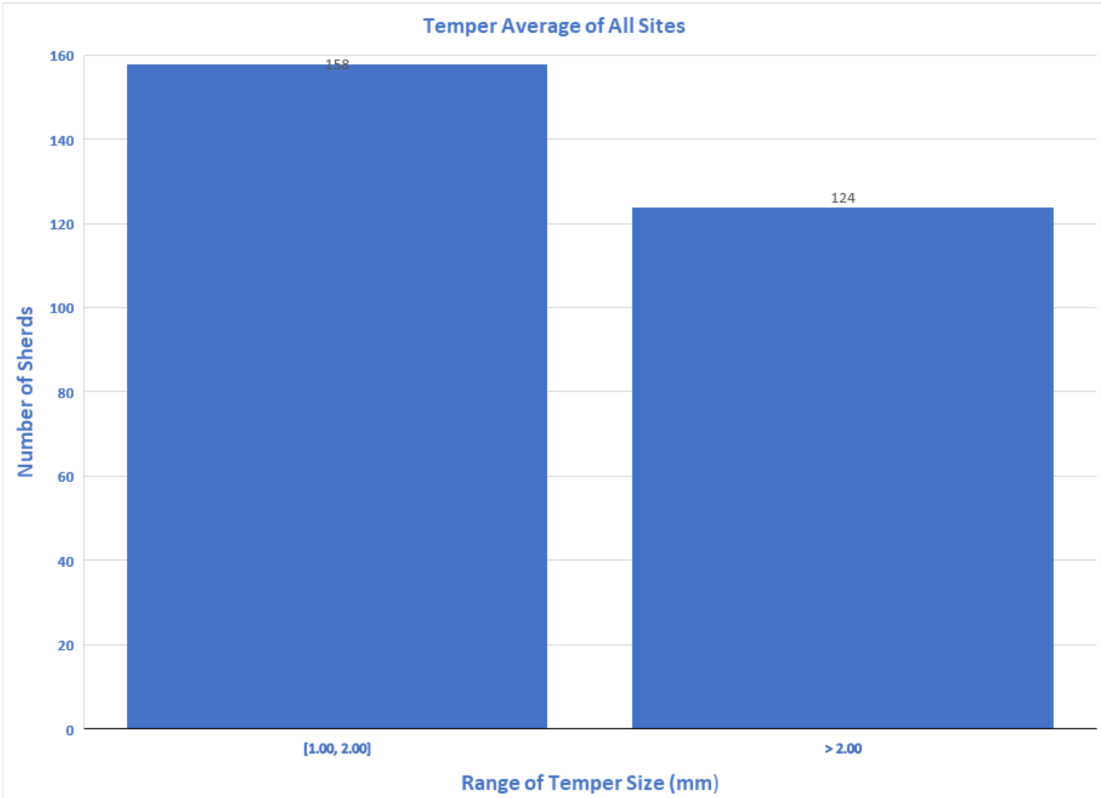

Figure 14. Average of Temper Grain Size from Three Sequatchie Valley Sites.

Sites Combined Temper Density Results

Data from all three of the Sequatchie Valley sites concerning temper density are combined and presented below (Figure 15). The most prevalent cluster of temper density, categorized as medium-density temper, measures between 15 and 30 pieces of temper per area. The second most prevalent cluster measures ≤15 pieces of temper per area, categorized as low-density. The smallest frequency of temper density consists of sherds with ≥30 pieces of temper per area, categorized as high-density. Based on these clusters, the most prevalent density observed from this assemblage consists of medium-density temper.

Therefore, ceramic producers in the Sequatchie Valley appear to produce the highest frequency of vessels with medium-density temper with a secondary preference for low-density temper. The initial expectation of results when combined with Coarse and Very Coarse tempering considerations for utilitarian vessels would be a correlation with high-density temper. Based upon these results, initial interpretations are that there does not appear to be a correlation. A discussion of the interpreted results follows in the analysis chapter below which attempts to rationalize these results.

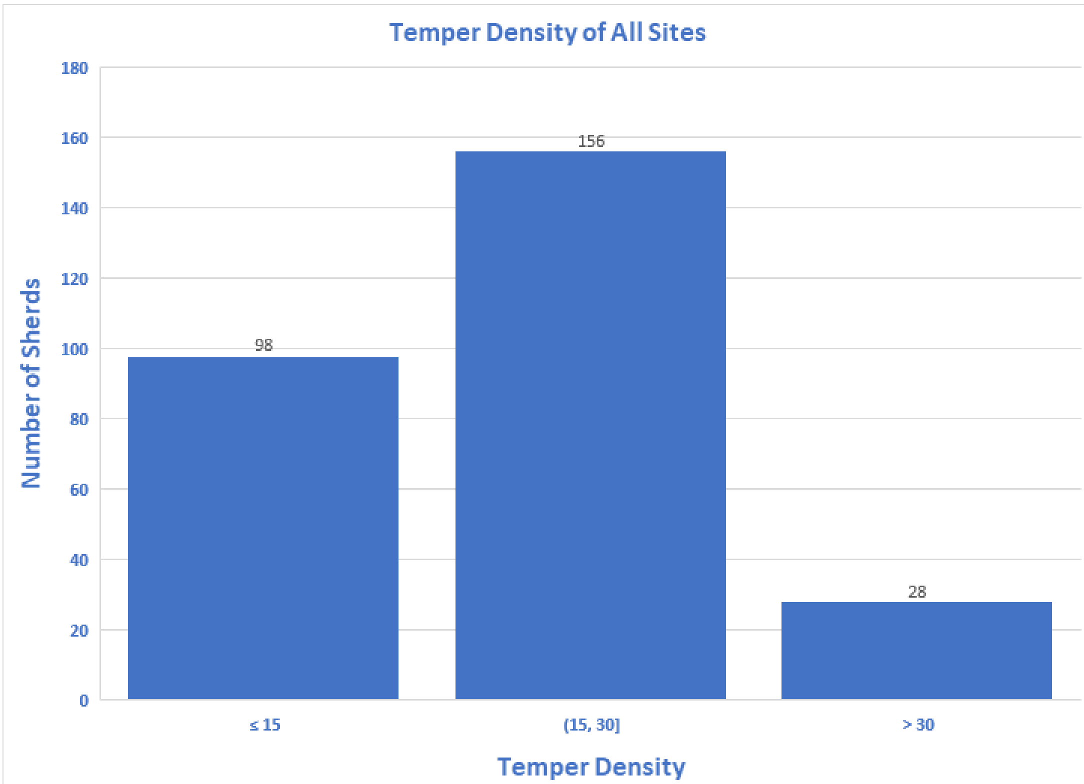

Figure 15. Temper Density of All Sites.

Sites Combined Exterior Surface Treatment Results

The prevalence of exterior surface treatments on the assemblages of all three sites from the Sequatchie Valley are readily summarized by combining the entirety of the Mulberry Creek plain assemblages from Sites 40BS103 and 40BS107 together (n=182) with the Mulberry Creek plain sherds from 40SQ115/40BS101 (n=88) for a total of 270 plain sherds, or 96% of the assemblage. The remaining sherds with evidence of exterior surface treatments comprise only 4% of the data (n=12) and are all from 40SQ115/40BS101 which have been previously described above.

With this, the results do not change with only higher incidents of plain pottery when incorporating the data from 40BS103 and 40BS107 into the data from 40SQ115/40BS101. There still appears to have not been a clear choice for the application of exterior surface treatments as a technofunctional advantage which reduces spalling and thermal shock cracking during repeated cooking events. Discussion of these results follows in the analysis chapter below.

Chapter 6: Analysis

Through the analysis of the research conducted on pottery assemblages from Sites 40SQ115/40BS101, 40BS103, and 40BS107, I aim to answer questions surrounding the technofunctional choices of ceramic producers in the Sequatchie Valley during the transition from the Middle to Late Woodland. First, I provide additional insight into the realization that producers of pottery were likely choosing cand very coarse limestone tempering for the production of utilitarian vessels. Second, I provide context for the realization that temper densities were generally Medium and Low, and why the expected versus the actual outcomes differ. Next, I explore why the overwhelming majority of analyzed pottery bears no evidence of exterior surface treatments except for a small number from Site 40SQ115/40BS101. Finally, I summarize what the functions of vessels in the Sequatchie Valley indicates about the lives of Sequatchie Valley residents during this transitional time period.

Analysis of Temper Grain Size Results

Residents of the Sequatchie Valley during the transitional Middle to Late Woodland period appear to have primarily produced vessels with an abundance of coarse and very coarse limestone tempering. A total of 56% of the sherds examined were categorized as coarse temper and the remaining 44% were very coarse. Perhaps the most interesting result of this research is the absence of fine tempering. This realization was consistent across all three analyzed sites and suggests continuity in the production process.

The data suggests that ceramic producers exclusively chose the coarse and very coarse tempering over the fine tempering for a specific reason. Previous research surrounding the technofunctional decisions of temper size indicates larger grain sizes are more resistant to the thermal shock (and subsequent cracking and ultimately breakage of vessels) when subjected to multiple heating and cooling episodes (Steponaitis 1982; Hoard et al. 1995). Therefore, I suggest that based on the appearance of large temper grain sizes from these assemblages, pottery producers in the Sequatchie Valley during this time period were producing vessels for utilitarian cooking purposes.

Additional evidence for the preponderance of sherds containing coarse temper grain sizes across all three sites includes the sociopolitical structures in place. The transitional Middle to Late Woodland appears to be a period of settlement and interregional cohesion. Residential communities are increasingly tied together through marriage networks where women move to new residential communities and bring their practices and techniques of pottery production (Sassaman 2002). Through multiple generations of shared knowledge of the most advantageous technofunctional decisions in the production process being shared inter-regionally, a cohesion of pottery vessels is seen. Essentially, the technological production process is refined and shared amongst the residents of the Sequatchie Valley to the point where coarse and very coarse limestone tempering is the most prevalent temper choice.

With interregional marriage networks acting as a force in the diffusion of production techniques, research suggests that the influence of the Hopewellian sphere of interaction is absent. Outside of the monumental mortuary centers and into the residential communities, such as in the Sequatchie Valley, the Hopewellian influence and demand for material goods to satisfy those power dynamics are diminished (Wright 2016; Wright and Gokee 2019). The daily life practices of producing cooking pots for utilitarian use evidenced in the material record of these three sites is more prevalent than vessels reserved for large ceremonial purposes outside of residential settings.

Analysis of Temper Density Results

While temper grain size provides insight into prehistoric vessel function and use, the density of tempering adds an additional technofunctional dataset through which to understand the possible functions of ceramic vessels. The results from the three Sequatchie Valley sites indicates that medium and lower temper densities were chosen more often during the production process. Combining the data from all three sites shows 55% of analyzed sherds contained a medium temper density, 35% fell into the low-density category, and the remaining 10% was categorized as high density. This range of densities indicates that 90% of pottery was produced with medium and lower density limestone tempering.

While my initial hypothesis was for an expected correlation of coarse tempering and high-density tempering for cooking vessels, I now suggest my results indicate that medium- and low-density tempering are still indicative of technofunctional choice for utilitarian vessels. In order to provide context to these results, I again lean on previous research. Braun (1982:189) conducted research on Middle Woodland period pottery from 11 Lower Illinois river valley sites which investigated temper grain sizes 1 mm or larger. This research realized a trend of decreasing temper density between approximately 2000 – 1000 BP across a variety of tempering materials which included sand, chert, and limestone. With my research having dates that fall within the middle of Braun's period of analysis (1400 – 1250 BP), and a comparative collective with sherds which exhibit limestone tempering, I suggest that the results from this research conform to Braun's findings of decreasing temper density over time. Specifically, I suggest that the transitional Middle to Late Woodland period in the Sequatchie Valley is evidence for a trend of decreasing density in limestone tempered utilitarian pottery. Therefore, I interpret the technofunctional choice of medium density tempering as a snapshot in time of a larger trend where temper density is decreasing for the production of utilitarian cooking vessels.

This apparent trend of decreasing temper density in utilitarian vessels over time provides additional evidence for the idea of interregional cohesion. This view of transitional Middle to Late Woodland in this region where utilitarian vessels are not only being produced, but with continual refinement, suggests that technofunctional decisions and traditions continue to persist with minimal Hopewellian influence. The marriage networks and regional gatherings for ritual events perpetuate a commonality of utilitarian pottery production techniques.

Analysis of Exterior Surface Treatment Results

Analysis of exterior surface treatments provides additional evidence for the technofunctional aspects of pottery production in the Sequatchie Valley during the transitional Middle to Late Woodland. Results from this research indicate that 96% of the sherds analyzed from the three sites were categorized as Mulberry Creek Plain and contained no evidence of exterior surface treatment, while the remaining 4% of sherds contained a variety of surface treatments. Interestingly, the 4% of the total assemblage that did contain surface treatments were all from one site (40SQ115/40BS101). Therefore, this was the only site which contained evidence for the application of exterior surface treatments from the three sites that were analyzed. The realization of this data indicates a clear preference for limestone tempered pottery with a plain exterior, or absence of surface treatment. My expected hypothesis was that there would be a correlation with exterior surface treatments, large limestone temper grain sizes, and high temper densities for utilitarian cooking vessels. This does not appear to be the realized results of this research.

Prior experimental archaeological research mixed with artifact data by Cogswell and O'Brien (1997) suggests exterior surface treatments should be more prevalent with utilitarian vessels which are needed to resist thermal shock based on the statistical significance of their experiment. It should be noted that while their research states that their findings are *statistically* significant, from an archaeological perspective, the results may not have been *behaviorally* significant (Cogswell and O'Brien 1997:171). I suggest that my research, where 96% of the pottery assemblage contained no evidence of surface treatments, mirrors prior findings which suggests the data may not have been a significant enough technofunctional advantage in the production of cooking vessels. In essence, utilitarian vessels were not dependent upon the presence of exterior surface treatment for adequate resistance to spalling and thermal shock.

The results indicate an overall lack of exterior surface treatments for the pottery assemblages at these three sites which provides additional evidence for the cohesion of interregional marriage and ritual networks during this transitional time period. Yet, the variety of eight different exterior surface treatments that did exist amongst the assemblage from Site 40SQ115/40BS101 begs further analysis.

Perhaps this site, geographically further south and closest to larger communities near the Tennessee River than the other two sites, was a part of other regional networks with different pottery production practices. Geographical proximity to wider or different networks would have afforded a greater variety of production practices, and therefore, a greater prevalence of exterior surface treatments evidenced in the assemblage. Similarly, the position of this site close to larger trade networks would have afforded higher incidences of pottery with different design elements.

Additionally, Site 40SQ115/40BS101 may have functioned as a village site rather than a dispersed residential homestead. If this were the case, then the pottery assemblage is likely to show more variety for the greater diversity of uses. Furthermore, the radiocarbon dates (1410 and 1370 BP) indicate this site, when compared to the other two studied in this research, is the earliest of the three. The ramifications of the site's occupation at the terminal Middle Woodland period could indicate a wider array of influences from extra-regional groups such as the Hopewell which would have thus, included a wider variety of pottery surface treatments.

It should be noted that exterior surface treatment is often also regarded as "subjectively for the purpose of enhancing an object's appearance or attractiveness" and may represent idiosyncratic choices outside of technofunctional decisions (Rice

2015:154). The relative prevalence of surface treatments from Site 40SQ115/40BS101 may then just be evidence for personal variations in the production process.

Summary of Analysis

The three variables in the pottery production process through which I chose to analyze the vessel function of limestone tempered wares in the Sequatchie Valley include temper grain size, temper density, and prevalence of exterior surface treatments. Each of these attributes contribute technofunctional decisions of the pottery production process which helps develop a sense of the political influences and daily practices of residents of this valley during the transitional Middle to Late Woodland.

Initial hypotheses surmised at the beginning of this thesis assumed that simple correlations would exist amongst the individual attributes outlined above. I anticipated a correlation of coarse limestone temper grain sizes with high density tempering and an abundance of variability in the types of exterior surface treatments on vessels. These assumptions were based upon Steponaitis's research at Moundville. Through the research process, different interpretations and assumptions have become clear. The technofunctional trends in the production of Sequatchie Valley pottery indicate an overall production of utilitarian cooking vessels. The vessels are comprised of coarse and very coarse limestone temper to aid in thermal shock resistance. Additionally, vessels during this period are comprised of medium and lower density tempering which is a snapshot in time of the larger trend of producing utilitarian vessels with decreasing temper densities throughout the Woodland period.

Finally, vessels are mostly void of evidence for exterior surface treatments except for a small variety from Site 40SQ115/40BS101.

Overall, the results of this research suggest shared practices of production with respect to the technofunctional aspects of utilitarian vessels. The Hopewellian sphere of influence in residential communities away from monumental mortuary centers appears to be limited which allows for the florescence of interregional networks. Specifically, marriage networks allow for the transfer of knowledge to disseminate across regions which are evidenced in the pottery production choices of women.

Chapter 7: Conclusion

This thesis provides an analysis of the transitional Middle to Late Woodland period in the Sequatchie Valley of southeastern Tennessee through archaeological evidence collected from sites 40SQ115/40BS101, 40BS103, and 40BS107. Three variables of the ceramic production process were analyzed to determine the technological decisions made for vessel functions. The attributes which were analyzed included the sizes of limestone temper grains, the average density of limestone tempering, and the prevalence of exterior surface treatments. Based upon Steponaitis's 1982 model of definitive technofunctional uses based on elements of pottery production, I suggest that Sequatchie Valley residents were producing utilitarian cooking vessels.

I provided a theoretical backing for which the data methods and analysis was built upon. This included an analysis of the socio-political changes during the transitional Middle to Late Woodland periods in the southeast which is grounded by the ideas that surrounding middle range societies are increasingly sedentary populations that maintain ties to a greater interregional network. The political structures and group identities of the residents of the three Sequatchie Valley sites are recognized through the ceramic assemblages which result from the *chaine operatoire* of marriage networks and female production modes. A Marxist framework provides a context of shared knowledge systems that produce material goods, such as pottery, for the benefit of the residential group.

After a brief historical context of the transitional Middle to Late Woodland period in southeastern Tennessee, I presented a methodological basis for how the analysis portion of the research was completed. Ceramic sherds from the three sites were subjected to analysis which included the investigation of limestone temper grain size and a calculation of the average limestone temper density. Furthermore, analysis of the prevalence of exterior surface treatments was explained for the range of sherds recovered from all three sites. Additionally, I provided a discussion of the limitations of this research and how certain assumptions are based upon the scope and breadth of this research.

Research results aimed to answer the questions proposed at the beginning of this thesis. A series of histograms which explain the results of each of the variables studied are presented by individual site. I then provide an inter-site analysis of the Sequatchie Valley ceramic assemblage as a whole.

Analysis of the research is also presented from an inter-site perspective which provides a clarity to the Sequatchie Valley region. Analysis of the limestone temper grain size results indicates the assemblages from all three sites are comprised of only coarse and very coarse tempering with no fine tempering present. I suggest that producers chose coarse tempering as a means to produce utilitarian vessels that are more resistant to thermal shock during cooking episodes. Additionally, I suggest that interregional cohesion through marriage networks perpetuates the sharing of knowledge practices to the point of technofunctional choices which are consistent across all three sites which were examined.

Additionally, I provide analysis of the average temper densities across all three sites. Results indicate that 90% of the pottery contained medium and low-density temper with the remaining 10% classified as high density. I suggest that these results are reflective of a larger trend of decreasing pottery densities of utilitarian vessels throughout the Woodland period, as evidenced through prior research conducted in Illinois. I further suggest that similar trends of data from all three sites are indicative of shared interregional production practices across the Sequatchie Valley.

Finally, I analyzed attributes of exterior surface treatments from the assemblages at all three sites. Research results indicate that 96% of sherds analyzed were classified as Mulberry Creek Plain pottery. The remaining 4% contained the only variability in exterior surface treatments which were all from Site 40SQ115/40BS101 and was represented through seven different surface treatments. I suggest the results indicate that the appearance of exterior surface treatments were not behaviorally significant enough to be realized in the production process to provide resistance to thermal shock. Additionally, the appearance of variability in surface treatments from Site 40SQ115/40BS101 are explained through a geographic proximity to different regional networks compared to the other two Sequatchie Valley sites that would have afforded different technofunctional traditions evidenced through the pottery assemblage. This site may also have been situated closer to larger trade networks where differentiation in the appearance of vessels was more common.

In summary, the significance of this research stands to answer questions of the transitional Middle to Late Woodland period of residential sites within the Sequatchie Valley of southeastern Tennessee. The residents of this valley appear to have had a generally limited level of influence from the Hopewellian sphere from a perspective of daily life outside of mortuary and ceremonial centers. Because of this lack of

Hopewellian interference, cohesion of groups through interregional networks are seen through the trends of shared pottery production techniques. The technofunctional aspects of the production process are evidenced in the results from this research through the temper grain size, density, and surface treatments. When analyzed and compared to other data, it appears Sequatchie Valley residents were largely producing utilitarian cooking vessels across the region during this transitional Woodland period.

Opportunities for future research in the Sequatchie Valley are vast. Until recently, the majority of past research has focused on the identification of large burial mounds at the southern end of the valley. Additional research focused on in-depth analysis of the residential sites which surely exist within the flatlands of the valley and associated rockshelter sites along the rocky escarpments and hillsides which line the valley would provide additional insight into the daily practices of residents outside of mortuary and ceremonial centers.

The archaeological community would also benefit from additional studies on the pottery assemblages from this region. This research focused on a very limited assemblage comprised of only limestone-tempered pottery from the Middle to Late Woodland period. There is surely a plethora of additional analysis which could be done on assemblages across time to include the Late Archaic, entire Woodland, and Mississippian periods in this region with such a density of important archaeological sites. Other research on pottery could include petrographic analysis of sherds to gain additional insight for a microscopic analysis of pottery characteristics which would afford opportunities to compare sherds with different tempering.

Additionally, research should expand beyond the confines of only the Sequatchie Valley. Regional studies comparing the smaller physiographic anomalies to one another would provide additional insight into the larger regional trends in southeastern Tennessee. The general location of the Sequatchie Valley near the eastern edge of the Cumberland Plateau, amongst the Ridge and Valley region, and still relatively close the western edge of the Appalachian Summit region allows for a comparison of data to larger regional trends where spatial and temporal patterns can be investigated.

Appendix

Site Num	Catalog ID	Typology	Exterior Surface Treatment	Temper Size1 (mm)	Temper Size2 (mm)	Temper Size3 (mm)	Temper Size4 (mm)	Temper Average	Thickness (mm)	Length (mm)	Area (mm2)	Num of Temper	Temper Density
40SQ115 /BS101	0003.00 82.1	Mulberry Creek	Plain	3	2	2	1	2	7	20	140	11	13
40SQ115 /BS101	0003.00 82.2	Mulberry Creek	Plain	4	3	2	3	3	6	21	126	5	25
40SQ115 /BS101	0003.00 82.3	Mulberry Creek	Plain	2	2	1	1	2	6	18	108	4	27
40SQ115 /BS101	0003.00 82.4	Mulberry Creek	Plain	4	2	2	2	3	5	19	95	4	24
40SQ115 /BS101	0003.00 82.5	Mulberry Creek	Plain	4	3	2	1	3	4	20	80	6	13
40SQ115 /BS101	0003.00 82.6	Mulberry Creek	Plain	3	4	3	3	3	6	19	114	6	19
40SQ115 /BS101	0003.00 82.7	Mulberry Creek	Plain	3	2	2	3	3	6	22	132	9	15
40SQ115 /BS101	0003.00 82.8	Mulberry Creek	Plain	2	2	1	3	2	7	17	119	6	20
40SQ115 /BS101	0003.00 82.9	Mulberry Creek	Plain	4	3	2	1	3	5	16	80	8	10
40SQ115 /BS101	0003.00 83	Unidentified	Unidentified Stamped	3	3	1	1	2	5	15	75	6	13
40SQ115 /BS101	0004.00 54.1	Mulberry Creek	Scraped	3	2	2	1	2	6	21	126	10	13
40SQ115 /BS101	0004.00 54.2	Mulberry Creek	Scraped	2	2	2	1	2	5	21	105	14	8
40SQ115 /BS101	0004.00 55.1	Mulberry Creek	Plain	2	3	3	2	3	7	24	168	8	21
40SQ115 /BS101	0004.00 55.2	Mulberry Creek	Plain	3	2	2	1	2	7	23	161	8	20
40SQ115 /BS101	0004.00 55.3	Mulberry Creek	Plain	3	2	1	2	2	6	26	156	8	20
40SQ115 /BS101	0004.00 55.4	Mulberry Creek	Plain	3	1	2	3	2	4	16	64	6	11
40SQ115 /BS101	0004.00 55.5	Mulberry Creek	Plain	3	3	3	1	3	5	24	120	8	15

Site Num	Catalog ID	Typology	Exterior Surface Treatment	Temper Size1 (mm)	Temper Size2 (mm)	Temper Size3 (mm)	Temper Size4 (mm)	Temper Average	Thickness (mm)	Length (mm)	Area (mm2)	Num of Temper	Temper Density
40SQ115/BS101	0004.0055.6	Mulberry Creek	Plain	4	2	1	1	2	7	15	105	6	18
40SQ115/BS101	0004.0055.7	Mulberry Creek	Plain	4	3	3	2	3	5	22	110	8	14
40SQ115/BS101	0004.0055.8	Mulberry Creek	Plain	1	3	2	3	2	5	17	85	6	14
40SQ115/BS101	0004.0055.9	Mulberry Creek	Plain	3	1	1	1	2	6	6	36	4	9
40SQ115/BS101	0004.0055.10	Mulberry Creek	Plain	2	2	1	1	2	5	20	100	7	14
40SQ115/BS101	0004.0055.11	Mulberry Creek	Plain	2	1	4	1	2	4	15	60	7	9
40SQ115/BS101	0004.0055.12	Mulberry Creek	Plain	3	2	2	1	2	5	14	70	20	4
40SQ115/BS101	0004.0055.13	Mulberry Creek	Plain	4	2	2	2	3	7	16	112	5	22
40SQ115/BS101	0004.0055.14	Mulberry Creek	Plain	2	2	2	2	2	7	14	98	8	12
40SQ115/BS101	0004.0055.15	Mulberry Creek	Plain	3	2	2	2	2	5	16	80	6	13
40SQ115/BS101	0004.0055.16	Mulberry Creek	Plain	1	1	1	2	1	8	16	128	10	13
40SQ115/BS101	0004.0055.17	Mulberry Creek	Plain	4	3	1	1	2	7	17	119	5	24
40SQ115/BS101	0004.0055.18	Mulberry Creek	Plain	3	3	2	2	3	7	18	126	9	14
40SQ115/BS101	0004.0055.19	Mulberry Creek	Plain	4	2	2	1	2	6	16	96	7	14
40SQ115/BS101	0004.0058	Unidentified	Unidentified Stamped	2	5	2	1	3	5	16	80	5	16
40SQ115/BS101	0025.0094	Pickwick	Curvilinear Complicated Stamped	3	3	3	1	3	5	19	95	6	16
40SQ115/BS101	0025.0095.1	Mulberry Creek	Plain	5	3	2	1	3	10	21	210	11	19
40SQ115/BS101	0025.0095.2	Mulberry Creek	Plain	4	2	2	2	3	7	16	112	4	28
40SQ115/BS101	0025.0095.3	Mulberry Creek	Plain	2	1	1	1	1	6	17	102	7	15

Site Num	Catalog ID	Typology	Exterior Surface Treatment	Temper Size1 (mm)	Temper Size2 (mm)	Temper Size3 (mm)	Temper Size4 (mm)	Temper Average	Thickness (mm)	Length (mm)	Area (mm2)	Num of Temper	Temper Density
40SQ115 /BS101	0025.00 95.4	Mulberry Creek	Plain	3	2	3	1	2	5	16	80	9	9
40SQ115 /BS101	0025.00 95.5	Mulberry Creek	Plain	2	3	2	2	2	8	14	112	8	14
40SQ115 /BS101	0025.00 95.6	Mulberry Creek	Plain	2	2	2	2	2	5	16	80	11	7
40SQ115 /BS101	0025.00 95.7	Mulberry Creek	Plain	2	1	1	3	2	7	18	126	13	10
40SQ115 /BS101	0025.00 95.8	Mulberry Creek	Plain	2	2	1	1	2	4	16	64	11	6
40SQ115 /BS101	0025.00 95.9	Mulberry Creek	Plain	1	2	2	2	2	5	18	90	9	10
40SQ115 /BS101	0025.00 95.10	Mulberry Creek	Plain	2	2	3	3	3	7	22	154	4	39
40SQ115 /BS101	0025.00 95.11	Mulberry Creek	Plain	4	4	2	2	3	7	21	147	8	18
40SQ115 /BS101	0025.00 95.12	Mulberry Creek	Plain	2	1	2	2	2	5	10	50	6	8
40SQ115 /BS101	0025.00 95.13	Mulberry Creek	Plain	2	2	2	2	2	5	10	50	4	13
40SQ115 /BS101	0025.00 95.14	Mulberry Creek	Plain	5	2	2	2	3	5	17	85	5	17
40SQ115 /BS101	0025.00 95.15	Mulberry Creek	Plain	3	2	2	1	2	6	15	90	7	13
40SQ115 /BS101	0025.00 95.16	Mulberry Creek	Plain	1	2	2	2	2	6	22	132	9	15
40SQ115 /BS101	0025.00 95.17	Mulberry Creek	Plain	5	5	2	1	3	8	18	144	5	29
40SQ115 /BS101	0025.00 95.18	Mulberry Creek	Plain	4	2	3	2	3	6	20	120	6	20
40SQ115 /BS101	0025.00 95.19	Mulberry Creek	Plain	2	2	3	1	2	5	18	90	4	23
40SQ115 /BS101	0025.00 95.20	Mulberry Creek	Plain	3	3	2	2	3	7	16	112	6	19
40SQ115 /BS101	0025.00 95.21	Mulberry Creek	Plain	5	2	2	1	3	4	14	56	6	9
40SQ115 /BS101	0025.00 95.22	Mulberry Creek	Plain	5	1	1	2	2	6	18	108	8	14

Site Num	Catalog ID	Typology	Exterior Surface Treatment	Temper Size1 (mm)	Temper Size2 (mm)	Temper Size3 (mm)	Temper Size4 (mm)	Temper Average	Thickness (mm)	Length (mm)	Area (mm2)	Num of Temper	Temper Density
40SQ115 /BS101	0025.00 97.1	Mulberry Creek	Plain	2	2	1	1	2	5	18	90	4	23
40SQ115 /BS101	0025.00 97.2	Mulberry Creek	Plain	3	3	1	2	2	5	18	90	5	18
40SQ115 /BS101	0025.00 97.3	Mulberry Creek	Plain	4	1	1	1	2	5	14	70	4	18
40SQ115 /BS101	0025.00 97.4	Mulberry Creek	Plain	1	1	1	2	1	5	13	65	4	16
40SQ115 /BS101	0030.00 52.1	Mulberry Creek	Plain	3	3	2	2	3	8	17	136	4	34
40SQ115 /BS101	0030.00 52.2	Mulberry Creek	Plain	1	1	2	1	1	7	22	154	6	26
40SQ115 /BS101	0030.00 52.3	Mulberry Creek	Plain	2	2	2	2	2	5	19	95	4	24
40SQ115 /BS101	0030.00 52.4	Mulberry Creek	Plain	3	4	2	2	3	6	15	90	5	18
40SQ115 /BS101	0031.00 69.1	Longbranch	Fabric Impressed	1	1	4	4	3	6	20	120	5	24
40SQ115 /BS101	0031.00 69.2	Longbranch	Fabric Impressed	4	2	2	2	3	6	24	144	12	12
40SQ115 /BS101	0031.00 70	Mulberry Creek	Plain	2	2	1	1	2	6	21	126	9	14
40SQ115 /BS101	0031.00 71.1	Mulberry Creek	Plain	3	2	2	3	3	7	19	133	8	17
40SQ115 /BS101	0031.00 71.2	Mulberry Creek	Plain	3	3	1	1	2	6	16	96	6	16
40SQ115 /BS101	0031.00 71.3	Mulberry Creek	Plain	2	2	2	1	2	7	20	140	4	35
40SQ115 /BS101	0031.00 71.4	Mulberry Creek	Plain	2	2	2	3	2	7	21	147	7	21
40SQ115 /BS101	0031.00 71.5	Mulberry Creek	Plain	3	1	1	2	2	5	17	85	6	14
40SQ115 /BS101	0031.00 71.6	Mulberry Creek	Plain	4	2	1	2	2	6	13	78	5	16
40SQ115 /BS101	0031.00 71.7	Mulberry Creek	Plain	1	1	1	2	1	5	15	75	7	11
40SQ115 /BS101	0031.00 72.1	Mulberry Creek	Plain	2	2	2	2	2	6	17	102	4	26

Site Num	Catalog ID	Typology	Exterior Surface Treatment	Temper Size1 (mm)	Temper Size2 (mm)	Temper Size3 (mm)	Temper Size4 (mm)	Temper Average	Thickness (mm)	Length (mm)	Area (mm2)	Num of Temper	Temper Density
40SQ115 /BS101	0031.00 72.2	Mulberry Creek	Plain	2	2	1	1	2	7	16	112	5	22
40SQ115 /BS101	0031.00 72.3	Mulberry Creek	Plain	3	2	2	2	2	7	22	154	6	26
40SQ115 /BS101	0031.00 72.4	Mulberry Creek	Plain	2	3	1	1	2	7	19	133	4	33
40SQ115 /BS101	0031.00 72.5	Mulberry Creek	Plain	3	1	1	3	2	5	16	80	8	10
40SQ115 /BS101	0032.00 45	Bluff Creek	Simple Stamped	2	2	2	1	2	5	12	60	4	15
40SQ115 /BS101	0033.00 43	Pickwick	Curvilinear Complicated Stamped	2	2	1	2	2	7	22	154	5	31
40SQ115 /BS101	0035.00 21	Pickwick	Curvilinear Complicated Stamped	3	1	1	3	2	7	41	287	8	36
40SQ115 /BS101	0035.00 22.1	Mulberry Creek	Plain	5	4	1	1	3	6	24	144	8	18
40SQ115 /BS101	0035.00 22.2	Mulberry Creek	Plain	3	2	2	2	2	6	18	108	6	18
40SQ115 /BS101	0035.00 22.3	Mulberry Creek	Plain	1	1	1	1	1	5	20	100	6	17
40SQ115 /BS101	0035.00 22.4	Mulberry Creek	Plain	2	2	1	1	2	6	25	150	12	13
40SQ115 /BS101	0035.00 22.5	Mulberry Creek	Plain	4	2	2	2	3	6	20	120	9	13
40SQ115 /BS101	0035.00 22.6	Mulberry Creek	Plain	2	2	2	2	2	7	24	168	7	24
40SQ115 /BS101	0035.00 22.7	Mulberry Creek	Plain	3	2	1	2	2	6	22	132	9	15
40SQ115 /BS101	0035.00 22.8	Mulberry Creek	Plain	1	1	2	2	2	6	25	150	10	15
40SQ115 /BS101	0054.00 12	Pickwick	Rectilinear Complicated Stamped	1	1	1	1	1	5	41	205	15	14
40SQ115 /BS101	0054.00 13	Unidentified	Scraped & Smoothed Stamped	2	1	1	1	1	6	47	282	18	16
40SQ115 /BS101	0054.00 18	Mulberry Creek	Plain	3	3	2	1	2	7	25	175	5	35

Site Num	Catalog ID	Typology	Exterior Surface Treatment	Temper Size1 (mm)	Temper Size2 (mm)	Temper Size3 (mm)	Temper Size4 (mm)	Temper Average	Thickness (mm)	Length (mm)	Area (mm2)	Num of Temper	Temper Density
40SQ115 /BS101	0054.00 19.1	Mulberry Creek	Plain	1	3	2	3	2	8	32	256	21	12
40SQ115 /BS101	0054.00 19.2	Mulberry Creek	Plain	2	2	2	2	2	7	24	168	8	21
40SQ115 /BS101	0054.00 19.3	Mulberry Creek	Plain	2	2	1	2	2	5	26	130	10	13
40SQ115 /BS101	0054.00 19.4	Mulberry Creek	Plain	3	2	2	1	2	5	30	150	9	17
40SQ115 /BS101	0054.00 19.5	Mulberry Creek	Plain	2	2	2	2	2	6	26	156	9	17
40SQ115 /BS101	0054.00 19.6	Mulberry Creek	Plain	2	2	2	2	2	6	23	138	18	8
40SQ115 /BS101	0054.00 19.7	Mulberry Creek	Plain	2	2	2	2	2	7	19	133	12	11
40SQ115 /BS101	0054.00 19.8	Mulberry Creek	Plain	3	2	2	1	2	5	25	125	6	21
40BS103	0022.00 13	Mulberry Creek	Plain	1	1	1	1	1	5	23	115	6	19
40BS103	0031.00 04.1	Mulberry Creek	Plain	2	3	1	1	2	11	36	396	10	40
40BS103	0031.00 04.2	Mulberry Creek	Plain	4	1	2	1	2	8	42	336	14	24
40BS103	0031.00 04.3	Mulberry Creek	Plain	1	1	1	2	1	8	42	336	9	37
40BS103	0031.00 04.4	Mulberry Creek	Plain	1	1	3	3	2	7	33	231	9	26
40BS103	0031.00 04.5	Mulberry Creek	Plain	4	1	2	2	2	8	22	176	8	22
40BS103	0031.00 04.6	Mulberry Creek	Plain	2	2	1	4	2	6	22	132	8	17
40BS103	0031.00 04.7	Mulberry Creek	Plain	7	4	3	1	4	9	29	261	15	17
40BS103	0031.00 04.8	Mulberry Creek	Plain	4	2	3	2	3	7	41	287	17	17
40BS103	0031.00 04.9	Mulberry Creek	Plain	3	2	2	2	2	6	31	186	9	21
40BS103	0031.00 04.10	Mulberry Creek	Plain	2	1	1	1	1	7	20	140	9	16

Site Num	Catalog ID	Typology	Exterior Surface Treatment	Temper Size1 (mm)	Temper Size2 (mm)	Temper Size3 (mm)	Temper Size4 (mm)	Temper Average	Thickness (mm)	Length (mm)	Area (mm2)	Num of Temper	Temper Density
40BS103	0031.00 04.11	Mulberry Creek	Plain	2	1	1	2	2	6	16	96	8	12
40BS103	0031.00 04.12	Mulberry Creek	Plain	1	2	2	2	2	8	18	144	5	29
40BS103	0031.00 04.13	Mulberry Creek	Plain	5	2	3	4	4	8	23	184	11	17
40BS103	0031.00 04.14	Mulberry Creek	Plain	5	3	2	1	3	7	21	147	9	16
40BS103	0031.00 04.15	Mulberry Creek	Plain	5	1	2	1	2	6	30	180	7	26
40BS103	0031.00 04.16	Mulberry Creek	Plain	2	3	4	3	3	7	27	189	11	17
40BS103	0031.00 04.17	Mulberry Creek	Plain	2	3	3	4	3	8	21	168	9	19
40BS103	0031.00 04.18	Mulberry Creek	Plain	1	3	3	2	2	7	21	147	7	21
40BS103	0031.00 04.19	Mulberry Creek	Plain	1	2	2	3	2	8	20	160	6	27
40BS103	0031.00 04.20	Mulberry Creek	Plain	1	2	2	3	2	8	26	208	12	17
40BS103	0031.00 04.21	Mulberry Creek	Plain	2	2	2	6	3	6	18	108	4	27
40BS103	0031.00 04.22	Mulberry Creek	Plain	2	2	2	2	2	8	36	288	16	18
40BS103	0031.00 05.1	Mulberry Creek	Plain	1	2	2	2	2	7	34	238	6	40
40BS103	0031.00 05.2	Mulberry Creek	Plain	3	2	2	5	3	6	31	186	6	31
40BS103	0031.00 05.3	Mulberry Creek	Plain	3	3	6	8	5	6	24	144	4	36
40BS103	0031.00 05.4	Mulberry Creek	Plain	3	3	2	2	3	5	21	105	4	26
40BS103	0031.00 05.5	Mulberry Creek	Plain	6	2	1	0	2	5	14	70	3	23
40BS103	0031.00 05.6	Mulberry Creek	Plain	1	2	2	2	2	6	15	90	4	23
40BS103	0031.00 05.7	Mulberry Creek	Plain	4	3	2	2	3	5	21	105	5	21

Site Num	Catalog ID	Typology	Exterior Surface Treatment	Temper Size1 (mm)	Temper Size2 (mm)	Temper Size3 (mm)	Temper Size4 (mm)	Temper Average	Thickness (mm)	Length (mm)	Area (mm2)	Num of Temper	Temper Density
40BS103	0031.0005.8	Mulberry Creek	Plain	3	1	2	1	2	7	21	147	7	21
40BS103	0031.0005.9	Mulberry Creek	Plain	3	2	0	0	1	5	20	100	2	50
40BS103	0031.0006	Mulberry Creek	Plain	4	3	1	1	2	7	16	112	5	22
40BS103	0031.0007.1	Mulberry Creek	Plain	1	3	2	1	2	7	20	140	5	28
40BS103	0031.0007.2	Mulberry Creek	Plain	2	3	1	2	2	5	16	80	6	13
40BS103	0031.0007.3	Mulberry Creek	Plain	2	3	3	1	2	7	26	182	6	30
40BS103	0031.0008.1	Mulberry Creek	Plain	1	3	3	1	2	6	21	126	6	21
40BS103	0031.0008.2	Mulberry Creek	Plain	2	2	2	2	2	6	18	108	7	15
40BS103	0031.0008.3	Mulberry Creek	Plain	1	1	1	1	1	7	14	98	11	9
40BS103	0031.0008.4	Mulberry Creek	Plain	1	1	1	2	1	7	16	112	12	9
40BS103	0031.0008.5	Mulberry Creek	Plain	4	2	4	1	3	6	22	132	5	26
40BS103	0031.0009.1	Mulberry Creek	Plain	3	2	1	1	2	6	16	96	6	16
40BS103	0031.0009.2	Mulberry Creek	Plain	3	2	1	1	2	6	18	108	11	10
40BS103	0031.0009.3	Mulberry Creek	Plain	3	1	1	2	2	6	15	90	5	18
40BS103	0031.0009.4	Mulberry Creek	Plain	1	1	1	1	1	4	18	72	7	10
40BS103	0031.0009.5	Mulberry Creek	Plain	3	2	2	2	2	3	17	51	5	10
40BS103	0031.0009.6	Mulberry Creek	Plain	2	2	3	1	2	5	13	65	5	13
40BS103	0031.0009.7	Mulberry Creek	Plain	1	1	1	1	1	2	10	20	6	3
40BS103	0031.0009.8	Mulberry Creek	Plain	2	2	2	1	2	6	20	120	6	20

Site Num	Catalog ID	Typology	Exterior Surface Treatment	Temper Size1 (mm)	Temper Size2 (mm)	Temper Size3 (mm)	Temper Size4 (mm)	Temper Average	Thicknes s (mm)	Length (mm)	Area (mm2)	Num of Temper	Temper Density
40BS103	0031.00 09.9	Mulberry Creek	Plain	1	1	1	1	1	6	21	126	4	32
40BS103	0031.00 10.1	Mulberry Creek	Plain	2	2	2	1	2	7	18	126	4	32
40BS103	0031.00 10.2	Mulberry Creek	Plain	2	5	2	1	3	6	14	84	7	12
40BS103	0031.00 10.3	Mulberry Creek	Plain	1	1	1	1	1	4	14	56	6	9
40BS103	0031.00 10.4	Mulberry Creek	Plain	4	2	1	1	2	6	16	96	7	14
40BS103	0031.00 10.5	Mulberry Creek	Plain	2	2	2	2	2	5	14	70	6	12
40BS103	0031.00 10.6	Mulberry Creek	Plain	2	2	1	1	2	6	14	84	10	8
40BS103	0031.00 10.7	Mulberry Creek	Plain	1	2	2	2	2	6	14	84	4	21
40BS103	0031.00 10.8	Mulberry Creek	Plain	1	2	2	4	2	7	15	105	6	18
40BS103	0031.00 10.9	Mulberry Creek	Plain	1	1	1	1	1	4	13	52	5	10
40BS103	0031.00 10.10	Mulberry Creek	Plain	1	2	2	3	2	8	17	136	15	9
40BS103	0031.00 10.11	Mulberry Creek	Plain	1	1	2	2	2	7	13	91	8	11
40BS103	0031.00 10.12	Mulberry Creek	Plain	2	2	1	1	2	5	15	75	8	9
40BS103	0031.00 10.13	Mulberry Creek	Plain	3	3	1	1	2	6	14	84	7	12
40BS103	0031.00 10.14	Mulberry Creek	Plain	3	1	1	2	2	5	16	80	5	16
40BS103	0031.00 10.15	Mulberry Creek	Plain	1	2	1	3	2	5	15	75	9	8
40BS103	0031.00 10.16	Mulberry Creek	Plain	5	2	1	1	2	5	14	70	6	12
40BS103	0031.00 11.1	Mulberry Creek	Plain	2	5	3	3	3	7	14	98	7	14
40BS103	0031.00 11.2	Mulberry Creek	Plain	3	3	1	1	2	6	14	84	10	8

Site Num	Catalog ID	Typology	Exterior Surface Treatment	Temper Size1 (mm)	Temper Size2 (mm)	Temper Size3 (mm)	Temper Size4 (mm)	Temper Average	Thickness (mm)	Length (mm)	Area (mm2)	Num of Temper	Temper Density
40BS103	0031.00 11.3	Mulberry Creek	Plain	1	2	2	4	2	6	27	162	20	8
40BS103	0032.00 01	Mulberry Creek	Plain	3	2	2	3	3	8	30	240	23	10
40BS103	0032.00 02	Mulberry Creek	Plain	2	2	2	1	2	6	20	120	8	15
40BS103	0032.00 04	Mulberry Creek	Plain	2	3	1	1	2	6	20	120	11	11
40BS103	0032.00 05	Mulberry Creek	Plain	8	3	2	2	4	9	23	207	7	30
40BS103	0032.00 06	Mulberry Creek	Plain	4	4	3	1	3	10	26	260	16	16
40BS103	0032.00 07	Mulberry Creek	Plain	2	4	2	1	2	6	26	156	7	22
40BS103	0032.00 08.1	Mulberry Creek	Plain	4	2	2	1	2	6	21	126	8	16
40BS103	0032.00 08.2	Mulberry Creek	Plain	2	3	1	1	2	5	25	125	9	14
40BS103	0032.00 09	Mulberry Creek	Plain	3	3	2	1	2	6	14	84	7	12
40BS103	0032.00 10	Mulberry Creek	Plain	4	2	2	1	2	6	11	66	6	11
40BS103	0032.00 11	Mulberry Creek	Plain	1	1	1	2	1	4	18	72	11	7
40BS103	0033.00 22	Mulberry Creek	Plain	1	4	2	2	2	7	22	154	6	26
40BS103	0038.00 03	Mulberry Creek	Plain	1	2	3	2	2	7	29	203	12	17
40BS107	0029.00 11.1	Mulberry Creek	Plain	5	4	2	1	3	7	25	175	8	22
40BS107	0029.00 11.2	Mulberry Creek	Plain	3	2	2	1	2	7	18	126	7	18
40BS107	0030.00 36	Mulberry Creek	Plain	5	1	1	2	2	4	16	64	4	16
40BS107	0031.00 59.1	Mulberry Creek	Plain	3	3	3	3	3	7	19	133	7	19
40BS107	0031.00 59.2	Mulberry Creek	Plain	3	2	2	1	2	5	13	65	4	16

Site Num	Catalog ID	Typology	Exterior Surface Treatment	Temper Size1 (mm)	Temper Size2 (mm)	Temper Size3 (mm)	Temper Size4 (mm)	Temper Average	Thicknes s (mm)	Length (mm)	Area (mm2)	Num of Temper	Temper Density
40BS107	0031.00 59.3	Mulberry Creek	Plain	3	2	3	1	2	6	25	150	8	19
40BS107	0031.00 59.4	Mulberry Creek	Plain	3	1	1	2	2	5	20	100	4	25
40BS107	0032.00 20.1	Mulberry Creek	Plain	2	1	1	3	2	5	20	100	16	6
40BS107	0032.00 20.2	Mulberry Creek	Plain	2	2	2	2	2	7	18	126	6	21
40BS107	0032.00 20.3	Mulberry Creek	Plain	2	2	2	1	2	6	16	96	5	19
40BS107	0032.00 20.4	Mulberry Creek	Plain	3	1	3	2	2	8	16	128	15	9
40BS107	0032.00 20.5	Mulberry Creek	Plain	2	1	1	2	2	5	17	85	7	12
40BS107	0032.00 20.6	Mulberry Creek	Plain	5	3	3	3	4	6	17	102	10	10
40BS107	0032.00 20.7	Mulberry Creek	Plain	4	2	2	1	2	6	20	120	7	17
40BS107	0032.00 20.8	Mulberry Creek	Plain	3	3	1	1	2	6	19	114	7	16
40BS107	0032.00 20.9	Mulberry Creek	Plain	2	2	1	1	2	6	13	78	6	13
40BS107	0032.00 20.10	Mulberry Creek	Plain	4	1	1	1	2	7	13	91	4	23
40BS107	0033.00 61.1	Mulberry Creek	Plain	2	2	1	3	2	9	25	225	9	25
40BS107	0033.00 61.2	Mulberry Creek	Plain	3	3	1	2	2	7	19	133	5	27
40BS107	0033.00 61.3	Mulberry Creek	Plain	4	1	1	2	2	6	19	114	7	16
40BS107	0033.00 61.4	Mulberry Creek	Plain	2	1	1	1	1	6	16	96	6	16
40BS107	0033.00 61.5	Mulberry Creek	Plain	2	2	1	1	2	7	21	147	8	18
40BS107	0033.00 61.6	Mulberry Creek	Plain	3	30	2	2	9	6	24	144	4	36
40BS107	0033.00 61.7	Mulberry Creek	Plain	5	4	2	1	3	7	20	140	5	28

Site Num	Catalog ID	Typology	Exterior Surface Treatment	Temper Size1 (mm)	Temper Size2 (mm)	Temper Size3 (mm)	Temper Size4 (mm)	Temper Average	Thicknes s (mm)	Length (mm)	Area (mm2)	Num of Temper	Temper Density
40BS107	0033.00 61.8	Mulberry Creek	Plain	2	1	2	1	2	7	19	133	5	27
40BS107	0033.00 61.9	Mulberry Creek	Plain	2	2	2	2	2	7	20	140	6	23
40BS107	0033.00 61.10	Mulberry Creek	Plain	4	3	2	2	3	6	20	120	5	24
40BS107	0033.00 61.11	Mulberry Creek	Plain	2	2	1	1	2	7	18	126	9	14
40BS107	0033.00 61.12	Mulberry Creek	Plain	3	2	2	1	2	7	16	112	23	5
40BS107	0034.00 14.1	Mulberry Creek	Plain	1	1	1	1	1	7	17	119	15	8
40BS107	0034.00 14.2	Mulberry Creek	Plain	2	2	1	1	2	8	22	176	7	25
40BS107	0038.00 51.1	Mulberry Creek	Plain	1	2	3	3	2	9	22	198	8	25
40BS107	0038.00 51.2	Mulberry Creek	Plain	1	1	1	1	1	6	19	114	12	10
40BS107	0039.00 49.1	Mulberry Creek	Plain	2	3	1	1	2	9	21	189	11	17
40BS107	0039.00 49.2	Mulberry Creek	Plain	3	2	2	1	2	7	17	119	7	17
40BS107	0039.00 49.3	Mulberry Creek	Plain	2	3	3	1	2	7	25	175	10	18
40BS107	0039.00 49.4	Mulberry Creek	Plain	2	2	2	5	3	8	34	272	13	21
40BS107	0039.00 49.5	Mulberry Creek	Plain	3	3	3	1	3	6	13	78	4	20
40BS107	0039.00 49.6	Mulberry Creek	Plain	3	2	2	1	2	6	20	120	4	30
40BS107	0100.00 07.1	Mulberry Creek	Plain	1	2	2	3	2	7	27	189	10	19
40BS107	0100.00 07.2	Mulberry Creek	Plain	3	2	1	1	2	4	14	56	6	9
40BS107	0101.00 14	Mulberry Creek	Plain	2	3	1	2	2	5	18	90	6	15
40BS107	0101.00 15.1	Mulberry Creek	Plain	4	2	2	2	3	8	19	152	6	25

Site Num	Catalog ID	Typology	Exterior Surface Treatment	Temper Size1 (mm)	Temper Size2 (mm)	Temper Size3 (mm)	Temper Size4 (mm)	Temper Average	Thicknes s (mm)	Length (mm)	Area (mm2)	Num of Temper	Temper Density
40BS107	0101.00 15.2	Mulberry Creek	Plain	3	2	1	1	2	7	20	140	4	35
40BS107	0101.00 15.3	Mulberry Creek	Plain	2	1	2	2	2	7	21	147	6	25
40BS107	0101.00 15.4	Mulberry Creek	Plain	3	2	2	3	3	8	27	216	5	43
40BS107	0101.00 15.5	Mulberry Creek	Plain	3	3	3	2	3	7	26	182	8	23
40BS107	0101.00 15.6	Mulberry Creek	Plain	3	3	3	1	3	7	15	105	7	15
40BS107	0101.00 15.7	Mulberry Creek	Plain	4	1	1	1	2	6	17	102	5	20
40BS107	0101.00 15.8	Mulberry Creek	Plain	3	2	2	1	2	6	16	96	4	24
40BS107	0101.00 15.9	Mulberry Creek	Plain	1	1	1	1	1	7	13	91	5	18
40BS107	0101.00 15.10	Mulberry Creek	Plain	2	1	1	2	2	7	16	112	5	22
40BS107	0102.00 05.1	Mulberry Creek	Plain	3	2	2	3	3	7	25	175	13	13
40BS107	0102.00 05.2	Mulberry Creek	Plain	4	2	5	5	4	6	30	180	13	14
40BS107	0102.00 05.3	Mulberry Creek	Plain	3	3	3	2	3	6	22	132	9	15
40BS107	0102.00 05.4	Mulberry Creek	Plain	2	5	4	1	3	6	21	126	7	18
40BS107	0102.00 05.5	Mulberry Creek	Plain	3	3	2	1	2	7	30	210	14	15
40BS107	0102.00 05.6	Mulberry Creek	Plain	5	4	2	2	3	7	22	154	5	31
40BS107	0102.00 05.7	Mulberry Creek	Plain	3	1	1	3	2	5	15	75	7	11
40BS107	0102.00 05.8	Mulberry Creek	Plain	5	1	2	1	2	8	21	168	6	28
40BS107	0102.00 05.9	Mulberry Creek	Plain	4	1	1	2	2	7	22	154	7	22
40BS107	0102.00 05.10	Mulberry Creek	Plain	3	2	2	1	2	7	18	126	5	25

Site Num	Catalog ID	Typology	Exterior Surface Treatment	Temper Size1 (mm)	Temper Size2 (mm)	Temper Size3 (mm)	Temper Size4 (mm)	Temper Average	Thicknes s (mm)	Length (mm)	Area (mm2)	Num of Temper	Temper Density
40BS107	0117.00 01	Mulberry Creek	Scraped	2	3	2	2	2	6	42	252	10	25
40BS107	0127.00 40	Mulberry Creek	Plain	2	2	2	2	2	6	27	162	5	32
40BS107	0130.00 14.1	Mulberry Creek	Plain	4	2	2	4	3	6	24	144	7	21
40BS107	0130.00 14.2	Mulberry Creek	Plain	4	2	4	1	3	6	30	180	6	30
40BS107	0130.00 15.1	Mulberry Creek	Plain	4	4	4	4	4	6	27	162	6	27
40BS107	0130.00 15.2	Mulberry Creek	Plain	2	2	2	1	2	7	35	245	10	25
40BS107	0130.00 15.3	Mulberry Creek	Plain	5	4	4	3	4	7	39	273	11	25
40BS107	0130.00 15.4	Mulberry Creek	Plain	3	3	2	2	3	6	17	102	7	15
40BS107	0130.00 15.5	Mulberry Creek	Plain	3	1	1	3	2	5	16	80	5	16
40BS107	0130.00 15.6	Mulberry Creek	Plain	1	2	2	1	2	6	40	240	10	24
40BS107	0130.00 15.7	Mulberry Creek	Plain	5	1	1	2	2	7	50	350	9	39
40BS107	0130.00 15.8	Mulberry Creek	Plain	4	2	1	1	2	7	16	112	4	28
40BS107	0130.00 15.9	Mulberry Creek	Plain	1	1	1	1	1	4	20	80	9	9
40BS107	0130.00 15.10	Mulberry Creek	Plain	2	2	2	2	2	6	15	90	5	18
40BS107	0130.00 15.11	Mulberry Creek	Plain	2	2	2	2	2	8	17	136	6	23
40BS107	0130.00 16	Mulberry Creek	Plain	1	1	1	2	1	7	34	238	13	18
40BS107	0141.00 37.1	Mulberry Creek	Plain	3	4	3	2	3	6	29	174	7	25
40BS107	0141.00 37.2	Mulberry Creek	Plain	6	4	2	2	4	7	24	168	5	34
40BS107	0141.00 37.3	Mulberry Creek	Plain	5	4	2	2	3	7	42	294	8	37

Site Num	Catalog ID	Typology	Exterior Surface Treatment	Temper Size1 (mm)	Temper Size2 (mm)	Temper Size3 (mm)	Temper Size4 (mm)	Temper Average	Thickness (mm)	Length (mm)	Area (mm2)	Num of Temper	Temper Density
40BS107	0141.00 37.4	Mulberry Creek	Plain	2	2	2	3	2	7	26	182	6	30
40BS107	0141.00 37.5	Mulberry Creek	Plain	2	2	2	2	2	7	40	280	10	28
40BS107	0141.00 37.6	Mulberry Creek	Plain	2	1	1	1	1	7	26	182	7	26
40BS107	0141.00 37.7	Mulberry Creek	Plain	1	1	1	2	1	7	30	210	4	53
40BS107	0141.00 37.8	Mulberry Creek	Plain	2	2	2	1	2	7	42	294	11	27
40BS107	0141.00 37.9	Mulberry Creek	Plain	2	3	1	1	2	4	45	180	6	30
40BS107	0141.00 38.1	Mulberry Creek	Plain	4	3	3	2	3	7	31	217	8	27
40BS107	0141.00 38.2	Mulberry Creek	Plain	3	2	4	2	3	7	25	175	11	16
40BS107	0141.00 38.3	Mulberry Creek	Plain	3	2	2	2	2	7	25	175	8	22
40BS107	0154.00 19.1	Mulberry Creek	Plain	3	1	2	2	2	6	35	210	8	26
40BS107	0154.00 19.2	Mulberry Creek	Plain	3	4	2	1	3	7	31	217	7	31
40BS107	0154.00 19.3	Mulberry Creek	Plain	1	2	2	1	2	7	25	175	10	18
40BS107	0154.00 19.4	Mulberry Creek	Plain	1	2	2	3	2	5	28	140	6	23
40BS107	0154.00 19.5	Mulberry Creek	Plain	2	2	2	4	3	9	21	189	7	27
40BS107	0154.00 19.6	Mulberry Creek	Plain	3	3	2	2	3	7	18	126	5	25
40BS107	0154.00 19.7	Mulberry Creek	Plain	3	3	1	1	2	6	21	126	4	32
40BS107	0154.00 19.8	Mulberry Creek	Plain	4	3	2	2	3	9	14	126	6	21
40BS107	0154.00 19.9	Mulberry Creek	Plain	4	2	2	2	3	6	25	150	7	21
40BS107	0154.00 19.10	Mulberry Creek	Plain	4	4	2	2	3	9	41	369	13	28

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